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STEEL
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PRODUCTION • PROCESSING • DISTRIBUTION • USE

Speaking of Shapes

use OHIO ROLLS

CARBON STEEL ROLLS	MOLYBDENUM CHILL ROLLS
ALLOY STEEL ROLLS	NICKEL CHILL ROLLS
OHIOLOY "K" ROLLS	FLINTUFF ROLLS
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HIGHLIGHTING
THIS ISSUE OF
STEEL

■ LAST week gave additional foretastes of the extent to which the defense program now can be expected to cut into business as usual. The Supply Priorities and Allocations Board **(p. 77)** urged all federal, state and local government agencies to refrain from issuing permits for building construction on which priorities assistance must be denied. Fire engines **(p. 87)** are no longer to be equipped with bells. Iron and steel scrap **(p. 79)** now is under full priorities with a mandatory distribution system to be applied as soon as it can be devised. Copper distribution **(p. 284)** is under stringent control . . . A new OPM setup **(p. 86)** provides for quick action in serious cases of priorities unemployment.

. . .

Aviation "Keystone"

Curtailment of automobile production **(p. 90)** is proving effective; last week's output was 79,065 units which compares with 107,957 in the same week in 1940. . . . Many questions are being asked as to why 1942 model automobiles carry so much bright metal trim; A. H. Allen, STEEL's Detroit editor **(p. 89)** gives the answer. . . . Wing Tips this week **(p. 92)** begins a description of activities at Wright Field, Army aviation nerve center. . . . Military plane output in September **(p. 93)** aggregated 1914 units. . . . Aviation is seen **(p. 93)** as the "keystone of American economy after the war". . . . Potential defense subcontractors should scan the latest lists of defense contract opportunities **(p. 98)** and of new primary defense contracts **(p. 94)**.

. . .

Shortages Abroad

Last week **(p. 75)** brought the start of the drive for a closed shop in the steel industry . . . More adequate locking facilities **(p. 104)** are seen necessary in the St. Mary's river . . . Steel and coal shortages are among the gravest problems facing France, says **(p. 100)** STEEL's French correspondent. The same shortages are reported by STEEL's Buenos Aires correspondent **(p. 101)** who reports the situation in the Argentine building industry is almost desperate . . . Scrap prices are not to be advanced **(p. 282)** and one larger broker **(p. 283)** has agreed to make refunds on scrap sold above the ceiling prices . . . OPM moves to protect Youngstown steelmakers **(p. 84)** against future water shortages . . . The zinc ceiling **(p. 84)** is up.

. . .

Analyzing The Garand

Professor Macconochie analyzes **(p. 110)** the action that occurs in firing the Garand semi-automatic rifle and describes the unusual operations and equipment involved in its manufacture. . . . Third article in the series on heating and heat treatment of ordnance **(p. 118)** is devoted to cartridge and shell cases. . . . Advanced techniques in making and using metal powders were presented **(p. 128)** at the M.I.T. powder metallurgy conference. . . . Built-in handling facilities **(p. 131)** speed the operation of welding sealing disks to shell bases—one of the essential safety features incorporated in modern shell to guard against explosion of the shell while still in the gun.

. . .

Metal Show Preview

"What you will see at the 1941 National Metal Exposition" is the title of STEEL's preview **(p. 166)** of the exhibits to be shown at the Philadelphia show the week of Oct. 20. Also included are complete program listings and an alphabetical list of exhibitors **(p. 251)**. . . . A single plant makes 10,000 bombs each day by means of high-production layout **(p. 116)**. . . . The correct sequence of operations is most important in obtaining the most from your welding, according to E. W. P. Smith **(p. 122)** in Section VII of his series. . . . E. W. Schellentrager reviews **(p. 134)** recent developments in scale cars for stockhouse service.

Inland, Too, Ships "BUNDLES FOR BRITAIN"

Deep in the holds of ships plying the Seven Seas are many "Bundles for Britain" from Inland Steel—billets for the rolling mills of England—tin plate for the canners of Australia—sheets for the oil drum manufacturers of Egypt.

Inland started early in 1940 doing its part in aiding "nations resisting aggression" with shipments of steel products to the British. Today, Inland is supplying steel to the Allies through U. S. Treasury orders, issued under the Lend-Lease Act.

These orders bearing high priority ratings, are an important part of America's defense—Inland's No. 1 Job.

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"This Is a Campaign for Closed Shop," Declares SWOC in Gary Strike

Small groups successful in causing sharp curtailment in steel production . . . Minor "grievances" seized upon as excuses for walkouts, often in violation of contracts

By E. F. ROSS
Chicago Editor, STEEL

CHICAGO

■ STEELMAKING operations in this district were cut sharply at the beginning of last week when 39 CIO soaking pit crane operators at the Gary, Ind., works of Carnegie-Illinois Steel Corp. staged an unauthorized strike, thereby forcing most of the plant's facilities to close.

After two days, however, Frank Grider, subdistrict director of the SWOC, told members of Local 1014 that the walkout violated the union's contract with the company and ordered them to return to work.

Average of steelworks operations in this district for the week dropped from 101½ per cent to 92 per cent.

The walkout by 13 of the cranemen began at midnight, Saturday, Oct. 4, in protest against a company request that one operator on each of the three shifts—a relief or spellman added to the shift for the hot weather period according to customary practice—be taken off. Within 15 minutes, just before their shift was to go on, the 13 cranemen telephoned they would not be at work. The night shift just finishing its turn declined to work overtime to keep the plant operating. The Sunday morning shift of 13 cranemen showed up at its regular turn but refused to work.

Scheduled to produce over 100,000 tons of ingots last week, the plant was quickly forced down and by Monday only 20 per cent of the normal working force of 15,500 was on duty.

Only two of its 52 open hearths were producing—these making ingots for export, whereas 48 had been scheduled. Five of the 12 blast furnaces were kept active, three of which were making merchant iron and two hot metal for the open hearths; the remaining seven were retarded. Two of 14 batteries of coke ovens were closed down. All rolling mills were stopped except the wheel mill.

Following resumption of work at midnight Monday, all production facilities were started up as rapidly as conditions permitted, a matter which required about two days.

Subsequently, the union presented a formal grievance protesting taking off the extra cranemen. It is understood the company had not intended to discharge the relief cranemen, but to transfer them to other jobs.

The steelworks walkout followed almost on the heels of settlement of a strike of 1800 workers at the Gary plant of American Bridge Co., another United States Steel Corp. subsidiary. These workmen had gone out several days before during a CIO dues checkup. Union leaders ordered them back to work.

Meanwhile, SWOC Local 1066 had been conducting a membership drive at the Gary sheet and tin mills of Carnegie-Illinois and had voted to oust all nonunionists by Oct. 11. Complete closing down of this plant, which employs approximately 9000, came without warning last Wednesday morning. This strike was ended Wednesday night.

The union started peaceful dues picketing at midnight Tuesday, but interference with workers early the following morning produced an altercation with Gary police. This resulted in Mr. Grider ordering union members not to enter the plant and those inside to come out,

Outlook "Ominous"

NEW YORK

■ The labor situation in steel looms ominously. A particular threat is seen in the launching of the drive by SWOC for a closed shop in United States Steel Corp. plants in Chicago last week.

With the avowed purpose of making the Steel Corporation 100 per cent SWOC union, a large labor rally was scheduled for Gary, Sunday, Oct. 12, and another for South Works, Tuesday, Oct. 14.

The Chicago SWOC regional director incited members to "waste no time" in seeing what the Corporation and other steel companies are going to do about the closed shop, but to "go ahead and get one."

"We not only can do it now but will do it now," he declared.

The whole situation throughout the steel industry appears to be pointing to serious labor trouble within 30 days.

which quickly brought a complete shutdown.

Claiming that the majority of workers are already members of the union, Grider asserted "this is a campaign to get a closed shop in the plant." The union offered to resume work pending settlement of the issue, "providing Gary police were removed, company guards were disarmed" (they were understood not to be armed), "and dues inspection would be permitted on company property." The union also threatened to call out workers at the Gary steelworks of the company and Gary plant of American Bridge Co. in sympathy strikes if its demands were not met.

J. M. Darbaker, general superintendent of the Gary sheet and tin plate mills said:

"At a conference between representatives of the company and the union, the company informed the union that it had no intention of interfering with any lawful, peaceful dues inspection which might be conducted by the union outside plant gates on the roadway used as a public highway for many years. The union representatives assured the management that dues inspection as contemplated 'is defined to mean dues inspection of union dues cards in a manner which will not interrupt production' and that 'it is the express purpose of the union to exert every effort to conduct dues inspections in a completely peaceful manner.'

"With respect to the union's complaint that plant protection forces were armed when the difficulties arose this morning, it developed that such was not the case and the union readily accepted the company's statement of policy, which prohibits the carrying of sidearms by plant protection forces except when they are engaged in guarding payrolls or when patrolling isolated plant areas at night.

Objected to City Police

"The union claimed that such violence as occurred on this morning's dues inspection line was brought about by action of the company in calling city police to the scene of activity. While the company did not concur in this statement it did agree with the union that it would not in the future request the presence of city police 'for the purposes of supervising peaceful dues inspections' outside plant gates, and there was joint agreement and understanding between the union and the company that, if in such peaceful dues inspections there arises a threat of law violations the company and the union will jointly request the presence of city police for the purpose of requiring law observance."

Trouble was still brewing at the Gary sheet and tin plate works last Friday as eight nonunion girl assorters got through a picket line and went to work. The union girls threatened to stop work, but their leaders prevented this and said they would present a grievance to the management.

SWOC conducted dues picketing Thursday night at the Federal furnace of Interlake Iron Corp. Chicago police protected the workers and all entered.

Electricians, Machinists Strike At TCI's Fairfield Steel Mill

Stoppage of steel production at Tennessee Coal, Iron & Railroad Co.'s Fairfield, Ala., steelworks was threatened last week when AFL electricians and machinists went on strike.

AFL spokesmen said the strike was called because the CIO Steel Workers Organizing Committee had established a dues card inspection line outside the plant and refused to permit anyone but CIO members to enter.

450 Idle at Niles Rolling Mill Plant in Wage Dispute

About 450 workmen at the Niles Rolling Mill Co.'s plant, Niles, O., were idle after a walkout last Friday closed down five sheet mills owing to a wage cut restoration dispute.

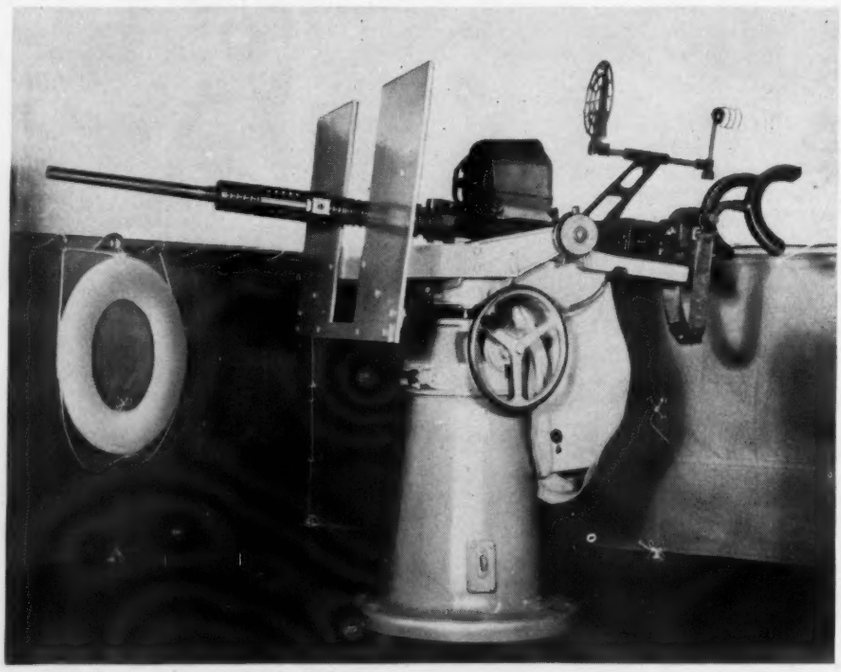
The company had declined to restore a reduction in wages of hot mill employes made in 1938, James Roemer, general superintendent, saying that to do so would impair the company's competitive position, and adding: "Our steel needs more direct labor per ton to produce than the big strip mills". Only a skeleton crew is completing some work in the annealing department and then will quit work.

Buffalo Forge Co. Plant Closed by SWOC Strike

The Buffalo Forge Co. plant at Buffalo was closed last week when SWOC workers struck for 10-cent hourly increases, bargaining conferences and reinstatement of three dismissed employes. Company holds $13,470,000 in defense orders.

■ Casting operations were resumed early last week by National Bronze & Aluminum Foundry Co., Cleveland, less than a week after the plant was seriously damaged by fire. Nearly 500 were reported at work again as the first casting was poured, and notification of the resumption of operations was sent to Frank Cliffe, chief, aluminum and magnesium section, OPM.

"Best Defense" Against Dive Bombers



■ **The 20-millimeter Oerlikon gun of Swiss origin, being built by Pontiac Motor Division of General Motors Corp. for the United States Navy, is considered the best defense against dive bomber attacks. Forty-one contractors from New England to Wisconsin supply 175 of the 195 parts required. Pontiac makes the gun barrels and breech mechanisms, tests the assembled units. Orders from the Navy were first tripled and then doubled again. In operation, the operator is strapped to the gun. See also STEEL, Oct. 6, p. 118**

SPAB Takes Control Over Private, Public Building To Conserve Materials

Projects using critical metals will not be permitted during emergency unless necessary to direct defense or essential to civilian welfare and safety

WASHINGTON

■ CONSTRUCTION projects, public or private, which require critical materials such as steel, copper, brass, bronze, aluminum and similar metals will not be permitted during the emergency unless these projects are either necessary for direct national defense or are essential to the health and welfare of the people.

This drastic policy was announced last week by the Supply Priorities and Allocations Board.

The policy applies to public projects—federal, state and local—such as the building of postoffices, courthouses and similar structures; to the construction of roads and highways; to river and harbor improvements; and to flood control and power projects. It applies to the construction of factories, lofts warehouses, office buildings and all other commercial construction. It applies to residential construction and to construction for public utilities.

SPAB pointed out that because of the defense program's heavy demand for metals it will not be possible for the United States to build all of the warships, planes, tanks and other things essential to its national security if the scarce metals are unnecessarily used in building projects which are not vital to defense.

In effect, the new policy means that on all building projects hereafter two tests will be applied:

1—Does this construction involve the use of appreciable quantities of critical materials?

2—Is the construction directly necessary for national defense, or clearly essential for the health and safety of the civilian population?

If the answer to the first question is "yes" and the answer to the second question is "no," priorities for the critical materials involved will not be issued.

Where construction actually has started and a substantial portion has been completed, SPAB said, efforts will be made to get the critical materials needed for completion of the project.

The entire policy, SPAB held, is based on the fact that no construction job which is not absolutely necessary is entitled to a share of the materials urgently needed for defense. If factories are obliged to close because they cannot get these materials, SPAB said, there would be neither rhyme nor reason in permitting the use of those same materials to erect public works, new factories, office buildings or other structures unless it could be shown plainly that such construction is vital to the nation.

SPAB urged all federal, state and local government agencies to refrain from issuing permits or other authorizations for construction work on which priorities assistance would have to be denied.

Suggests Codes Be Suspended

It also suggested that building codes in many cities require the use of excessive amounts of critical materials, and urged that such codes be suspended during the emergency.

In arriving at this policy, SPAB surveyed the entire field of construction to see what quantities of critical materials are used, how much money is involved, how much labor is employed and what defense and civilian needs are being met.

Total construction during 1941, SPAB found, will probably reach $11,000,000,000—about equal to the highest levels previously reached in 1926 and 1927. This figure does not include approximately $3,000,000,000 which is being spent during the year on maintenance, repair and remodeling.

Of the $11,000,000,000, about $4,900,000,000 is being spent on defense construction, as follows:

Military construction	$1,800,000,000
Industrial facilities	1,700,000,000
Defense housing	1,200,000,000
Defense highways	200,000,000

Nondefense construction for the year totals $6,300,000,000. The breakdown here is as follows:

Residential construction	$1,800,000,000
Industrial construction	500,000,000
Public works	1,500,000,000
Commercial buildings	900,000,000
Public buildings	400,000,000
Privately financed utilities	700,000,000
Farm construction	500,000,000

The critical material chiefly used in construction work is, of course, steel. The 1941 construction program is using about 13,800,000 tons of steel ingots—roughly one-sixteenth of the year's total consumption—of which approximately 6,300,000 tons are being used for nondefense construction. Industrial and public buildings are the chief sources of demand for steel in the nondefense construction area.

SPAB estimated that under the restricted program, steel used in nondefense construction could be held to less than 3,000,000 tons. These savings would be partially offset by the fact that defense construction in 1942 would require about 1,200,000 more tons of steel than were used in defense construction during the current year.

In addition, SPAB suggested that extensive additional savings might be made through substitution and conservation. In many types of public works and buildings the use of steel can be almost entirely eliminated. Reinforced concrete pipes can be used in place of steel for water mains. Buildings erected for emergency use can be built to less stringent specifications than those designed for permanent use, and hence can be built with less steel.

Employment in all types of construction in 1941 has averaged about 2,400,000 men, with a peak of 3,100,000 men reached in the present month. Defense construction is employing 1,200,000 workers. Nondefense construction employs 1,500,000

and 400,000 men are at work on maintenance, repair and remodeling.

SPAB's studies indicate that defense construction next year will require about the same number of workers that it now uses. The amount of maintenance, remodeling and repair work during the year is expected to be roughly equal to the volume in 1941. Principal reductions in employment, therefore, will occur in the field of nondefense construction.

In that field, SPAB pointed out, growing shortages of critical materials would cause a considerable displacement of workers even if a policy of restricting nondefense construction were not adopted. In areas where defense work is being done, it is believed that other types of employment will rapidly absorb construction workers displaced through cessation of nondefense building.

■ Charles J. Hardy, president, American Car & Foundry Co., New York, reported in his address before the twenty-second annual meeting of the Army Ordnance Association, Detroit, Oct. 9, that the company is building military combat tanks at the rate of 400 a month, and expects shortly to step this up to 500.

MEETINGS

Gear Manufacturers Association To Meet in Chicago Oct. 20-22

■ PRACTICALLY the entire technical program of the American Gear Manufacturers Association at Edgewater Beach hotel, Chicago, Oct. 20-22, will be devoted to a symposium on gear-tooth strength. Reports will be presented on lubrication, a recommended practice for gear steels, and a progress report on recent gear and roller wear testing. The commercial part of the program will be devoted to priorities, taxes, labor and customer relations. A feature of the meeting will be an address by W. G. Bailey, priorities director of OPM's regional office, Chicago, on priorities and allocations as they apply to the gear industry.

Regional Foundry Conference Geared To Current Problems

■ Foundry problems in national defense will form the basis of discussion at the joint regional foundry conference, Purdue University, West Lafayette, Ind., Oct. 17-18, sponsored by the Central Indiana, Michigan and Chicago chapters of the American Foundrymen's Association and the department of engineering extension of Purdue University. Sixteen papers will be presented at the four sessions equally divided between gray iron, malleable, steel and nonferrous groups and one paper primarily for the benefit of students. At the joint chapter dinner, Friday evening, E. L. Shaner, president, Penton Publishing Co., Cleveland, will speak on "Shortages—Material and Otherwise."

Schedules Animated Playlet For Chemical Exposition

Two levels will be used by subsidiaries of United States Steel Corp. in an exhibit in Spaces 76 and 77 at the Chemical Industries Exposition, Grand Central Palace, New York, Dec. 1-6.

In addition to providing a diversified display of steel products of particular interest to the chemical industry in two lounge-reception rooms built into the exhibit, a unique mechanical stage unit has been provided. On this stage will be presented a three-minute animated playlet entitled "Grime Does Not Pay," which dramatically portrays the main reasons why chemical plants profit by their use of stainless steel.

Demonstrate Million-Volt X-Ray Machine

■ At an X-ray symposium in General Electric Co.'s Schenectady Works, Oct. 7, the new industrial million-volt X-ray unit shown in the accompanying illustration was described and demonstrated. Already such units are being used by Babcock & Wilcox Co., Barberton, O., and Combustion Engineering Co. Inc., Chattanooga, Tenn., to shorten inspection of boiler drums and pressure vessels and to examine wall thicknesses heretofore impractical; by Ford Motor Co., to speed examination of aircraft forgings; by General Electric "for 100 per cent examination of large castings."

Weighing only 1500 pounds and easily handled, the new units also are being installed at Norfolk and Philadelphia Navy Yards for ordnance work; at Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., for inspection of heavy steel bomb casings and diesel crankshafts weighing up to 4200 pounds; at American Steel Foundries, Granite City, Ill., for speeding defense work.

The advantages claimed include: Ability to inspect 6-inch thicknesses of steel; better definition in negatives, making results easier to interpret; compact equipment may be adjusted to suit extremely wide range and angle of coverage from few degrees up to 140 degrees; great increase in speed, since it will photograph through 5 inches of steel in 2 minutes, whereas a 400,000-volt outfit requires three and a half hours and still does not give detail obtained with the larger unit. The unit permits X-ray examination of six castings on one exposure where previously six exposures per casting were needed.

Scrap Iron and Steel Placed Under Complete Priority Rule

Director of Priorities authorized to issue specific directions for deliveries . . . Producers, brokers, consumers required to make monthly reports

WASHINGTON

■ SCRAP iron and steel has been placed under full priority control, effective Oct. 11, by the OPM Priorities Division.

This order, designed to relieve serious day to day shortages, authorizes the director of priorities to issue specific directions for deliveries of scrap.

The order further provides that producers, dealers and brokers, and consumers of iron and steel scrap shall make monthly reports to the Priorities Division. Beginning Nov. 15, producers will be required to report scrap inventories, production and sales; brokers will show inventories, purchase, and sales; and consumers must indicate inventories, production, receipts, and consumption of scrap metal.

(Forms on which the monthly reports are to be made will be available sometime this week, Priorities Division officials announced).

It is expected that, on the basis of these reports, a general policy for the distribution of scrap under mandatory orders will be developed.

Scrap is defined in the order as "all ferrous materials, either alloyed or unalloyed, of which iron or steel is a principal component, which are the waste of industrial fabrication, or objects that have been discarded on account of obsolescence, failure or other reason."

The order emphasizes that the provisions of priorities regulation No. 1 apply to ferrous scrap. These provisions include prohibition of excess inventory, and stipulate that intracompany deliveries are subject to the same requirements that apply to intercompany deliveries.

Provisions of the order do not apply to producers who produced less than 20 gross tons of scrap during the month ending Nov. 15. No such exemption on the basis of quantity was extended to any dealers or brokers, however.

The order also provides that the director of priorities may issue specific directions to any person as to the source, destination, or the amount of scrap to be delivered or acquired by such person.

OPM threatened violators of the order will be prohibited from making or receiving deliveries of scrap.

Unless extended, the order will expire June 30, 1942.

In a communication to all producers, consumers and all brokers and dealers in iron and steel scrap, Priorities Director Nelson said:

"The director of priorities, Office of Production Management, is today filing for publication in the federal register, general preference order M-24, which imposes a mandatory priority system upon the iron and steel scrap industry.

"Priority Action Necessary"

"Over the past months the supply of iron and steel scrap has become increasingly unsatisfactory. In order to direct distribution of these essential materials, it has become necessary to take priority action. Among the more important provisions of the order are the following:

"(1) The provisions and controls of priorities regulation No. 1 are specifically extended to the iron and steel scrap industry. It requires the acceptance and preferential treatment of defense orders, prescribes the sequence in which deliveries shall be made, and establishes certain requirements for the keeping of records, etc. These provisions are effective at once.

"(2) Monthly reports are required of producers, consumers, dealers, and brokers, who are defined in the order. Forms of reports with complete instructions will be furnished shortly. These forms may be reproduced by persons for their own use or additional copies may be obtained from the iron and steel branch, Office of Production Management. Note that the order requires the filing of reports on the fifteenth day of each month, covering the preceding month. The first report will be due on Nov. 15, 1941.

"(3) The director of priorities is given broad powers to control deliveries of scrap. This provision is effective at once. You will be notified from time to time of rulings and interpretations applying to this order. Any questions which may arise in connection with compliance with the terms of this order should be addressed to A. D. Whiteside, chief, iron and steel branch, Office of Production Management, Washington.

"For your information, attention is called to the following provision of the act of Congress approved May 31, 1941, (public No. 89, 77th Congress); 'no person, firm, or corporation shall be held liable for damages or penalties for any default under any contract or order which shall result directly or indirectly from his compliance with any rule, regulations, or order issued under this section.'

"This letter does not purport to be a complete summary of general preference order M-24 or priorities regulation No. 1. You must read the order and the regulation carefully so that you may fully understand their provisions and their effect upon your business."

Text of the order follows:

TITLE 32 — NATIONAL DEFENSE, CHAPTER IX — OFFICE OF PRODUCTION MANAGEMENT, Subchapter B — PRIORITIES DIVISION, Part 965 — IRON AND STEEL SCRAP, GENERAL PREFERENCE ORDER NO. M-24 TO CONSERVE THE SUPPLY AND DIRECT THE DISTRIBUTION OF IRON AND STEEL SCRAP.

WHEREAS, the national defense requirements have created a shortage of iron and steel scrap for de-

(*Please turn to page* 282)

MEN of INDUSTRY

■ **EDWIN A. WERT,** the past 18 years associated with Detroit Edison Co. in an engineering and design capacity, has been appointed vice president in charge of engineering and sales, Power Piping Division, Blaw-Knox Co., Pittsburgh. Mr. Wert has been a consultant for Blaw-Knox for a number of years, and is the inventor of the Blaw-Knox functional spring hangers and vibration eliminators for high pressure-high temperature piping systems.

♦

Joseph P. Clark has retired as superintendent, Logan Iron & Steel Co., Burnham, Pa.

♦

Clem W. Gottschalk, since 1932 assistant traffic manager, Jones & Laughlin Steel Corp., Pittsburgh, has become general traffic manager, succeeding **H. E. Graham,** who will retire Nov. 1.

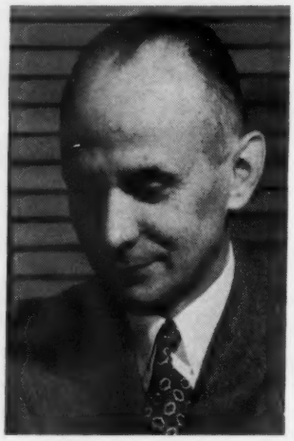
♦

Robert D. Knight has been appointed superintendent of the spring mill, South Works, American Steel & Wire Co., Worcester, Mass. He formerly was assistant general foreman in the spring mill. **Harry F. Clarke** has been made assistant superintendent of the same plant, while **George E. Hansen** has been named product engineer in the metallurgical department, South Works.

♦

John A. O'Brien has been elected vice president, Johns-Manville Sales Corp., New York. He will continue as general sales manager of the power products and industrial department, a post he has held since 1938. Mr. O'Brien joined the company in 1915.

John A. O'Brien



Edwin A. Wert

C. W. Gottschalk

♦

William F. Lamoreaux has been appointed director of research, Meehanite Metal Corp., Pittsburgh. Mr. Lamoreaux was formerly vice president, general manager and director, Ducktown Chemical & Iron Co., Isabella, Tenn.

♦

Campbell Wood has been named general manager of Nash-Kelvinator Corp.'s national defense plants in Lansing, Mich. He formerly was identified with the corporation's Washington office.

♦

Ward F. Simmons, metallurgical engineer, formerly associated with American Steel & Wire Co. at Duluth, has joined the technical staff of Battelle Memorial Institute, Columbus, O.

♦

R. H. Musser, the past four years assistant district sales manager, Chicago office of Heppenstall Co., Pittsburgh, has been named manager, priorities department, with headquarters in Pittsburgh.

♦

Walter E. Hawkinson, treasurer, Allis-Chalmers Mfg. Co., Milwaukee, has been named secretary, succeeding **W. A. Thompson,** who has resigned as secretary and vice president. Mr. Hawkinson will continue as treasurer.

♦

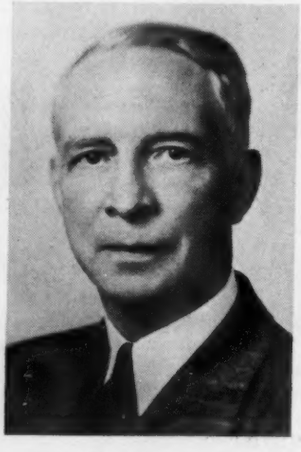
Harry L. Bill, formerly president and general manager, United Aircraft Products Inc., Dayton, O., has been elected vice president, Greenfield Tap & Die Corp., Greenfield, Mass. He will also act as general manager.

♦

William A. Craig, heretofore assistant purchasing agent of Link-Belt Co.'s Philadelphia plant, has become purchasing agent there, succeeding the late James C. Lenahan. Mr. Craig has been associated with Link-Belt since 1916.

♦

Maurice N. Landis has been appointed manager, Metallurgical and Research Division, LaSalle Steel Co., Chicago. He has served as chief metallurgist the past ten years, and before that was plant superintendent. **Henry N. Landis** has been named assistant manager of metal-



W. F. Lamoreaux

lurgical engineering, under **H. E. Mack,** vice president in charge of metallurgical engineering. **A. Frank Gclick,** formerly a special sales representative, has become assistant general manager of sales under **T. L. Kelly,** executive vice president in charge of sales.

♦

Harlan H. Newell has been elected treasurer and a director, Cleveland Automatic Machine Co., Cleveland. Mr. Newell formerly was associated with the Society for Savings as investment analyst and, since June, 1927, as vice president.

♦

H. G. Hilton, vice president, Steel Co. of Canada Ltd., Hamilton, Ont., has been elected a director. Before joining the company in 1919, as blast furnace superintendent, Mr. Hilton was associated with blast furnace operations of Pickands, Mather & Co.

♦

C. A. Johnson has been appointed general manager of sales, fabricated steel construction, Bethlehem Steel Co., Bethlehem, Pa. He succeeds **C. M. Denise,** who has resigned because of ill health. Mr. Johnson began his career with Worden-Allen Co., Milwaukee, and later was transferred to Lackawanna Bridge Co., Buffalo, a subsidiary of Worden-Allen, which subsequently was acquired by Lackawanna Steel Co. Following Bethlehem's acquisition of Lackawanna, Mr. Johnson was named manager of Bethlehem's fabricated steel sales, which position he has held until the present time.

♦

Norman P. Goss has been appointed a research engineer, American Steel & Wire Co., Cleveland. A graduate of Case School of Applied Science, Mr. Goss joined General Electric Co. in 1925 and two years later became associated with American Steel & Wire. From January, 1931, to March, 1932, he attended the graduate school at the University of Illinois, specializing in mathematical physics, following which he joined Cold Metal Process Co., Youngstown, O., where he continued his X-ray work and metals research. Mr. Goss holds a number of patents on strip steels.

Harlan H. Newell

C. A. Johnson

♦

R. H. McCormick has been placed in charge of all advertising and sales promotion, Vascoloy-Ramet Corp., North Chicago, Ill., affiliate of Fansteel Metallurgical Corp. He succeeds **A. L. Percy,** who will continue as advertising manager of Fansteel.

♦

H. S. Brink, formerly assistant plant industrial engineer, Gary, Ind., works of Carnegie-Illinois Steel Corp., has been promoted to plant industrial engineer.

Other personnel changes at the Gary works include **E. H. Gott,** who has been transferred from the industrial engineering department to the maintenance department as assistant division superintendent; **A. F. Giese Jr.,** heretofore superintendent of the 44-inch blooming mill and 36-inch slab mill, becomes division superintendent of maintenance; **J. F. Frain,** formerly superintendent of the 12-inch No. 1 merchant mill, becomes superintendent of the 44-inch blooming and 36-inch slab mill; **W. N. Nagel,** assistant to division superintendent, plant maintenance division, has been appointed assistant plant industrial engineer; **F. L. Collins,** formerly assistant division superintendent of power and fuel, becomes electrical engineer, and **H. R. Middlebrook,** heretofore assistant division superintendent of maintenance, has been made assistant division superintendent, power and fuel.

♦

James W. Parker, vice president and chief engineer, Detroit Edison Co., has been elected president, American Society of Mechanical Engineers for the year 1942.

Vice presidents elected to serve two-year terms on the council are: **Clarke F. Freeman,** senior vice president and engineer, Manufacturers Mutual Fire Insurance Co., Providence, R. I.; **C. B. Peck,** managing editor, *Railway Mechanical Engineer,* New York; **W. H. Winterrowd,** vice president, Baldwin Locomotive Works, Eddystone, Pa.; **W. R. Woolrich,** dean of the College of Engineering, and director of the Bureau of Engineering Research, University of Texas, Austin, Tex.

Managers elected for three-year terms include **W. G. Christy,** smoke abatement engineer of Hudson county, New Jersey; **H. L. Eggleston,** manager, gas and refining departments, Gilmore Oil Co., Los Angeles, and **T. S. McEwan,** Chicago district manager, Defense Contract Service.

The new officers will be installed during the sixty-second annual meeting of the society in New York, Dec. 1-5.

Elmer D. Heinz
Whose appointment as secretary, Niagara Machine & Tool Works, Buffalo, was noted in STEEL, Oct. 6, page 28

George E. Munschauer
Who has been elected treasurer, Niagara Machine & Tool Works, Buffalo, as reported in STEEL, Oct. 6, page 28

Safety Promotion Among New Workers Urged To Curb Rising Accident Rate

■ "NEW, inexperienced workers, rushed into industrial plants without adequate training are largely responsible for the recent sharp rise in industrial accidents," it was declared at the thirtieth National Safety Congress and Exposition, Chicago, last week.

Accident rates in the first year of employment usually are at least twice rates in subsequent years, R. J. Greenly, chief, training division, Carnegie-Illinois Steel Corp., Pittsburgh, told the Power Press Section.

"Substantial results can be obtained," Mr. Greenly said, "from concentrated s a f e t y promotion among this high-accident group of new and inexperienced workers.

"A recent survey by the National Safety Council disclosed the principal causes of accidents among inexperienced workers to be deficient knowledge of safe practices and lack of skill. This suggests new men were not prepared to be safe workers before being placed on the job."

V. E. Perry, director of training, American Rolling Mill Co., Middletown, O., discussing foremen training in the Metals Section meeting, said:

"The foreman who substitutes diplomacy and thoughtfulness for roughshod authority — who gets things done safely and efficiently because he sees others' points of view rather than because he has authority to order things done, will have the best safety record.

Management's Responsibility

"Foremen must understand the thoroughly selfish attitude of the men and realize the latter's reaction to suggestions is guided strictly by a 'what-will-it-get-me' attitude. Ideas the foremen present arouse interest only to the degree they harmonize with personal desires of the men."

"An effective, hard hitting safety department provides industrial management with a tool as vital to high quality production as scientific research, modern machines and skilled workmen—equal in importance to management itself," asserted P. C. Kauffman, superintendent of safety and welfare, Jones & Laughlin Steel Corp., Brackenridge, Pa., in an address before the Metals Section.

"Fundamental responsibility for safety of workmen in any plant rests upon top management, and management should remember all parts of a man must be as well guarded against accident as are parts of an expensive machine.

"Management must see that every effort is put forth to use improved methods which will make man the master of his machine."

A prime responsibility, he further explained, is realization of accident possibilities that exist in a mill, a factory or an office as well as recognition of the limits of human behavior. With these given proper consideration, plans must be formulated and executed to guard the unguarded hazard and the unguarded mind.

Belief that "not all the steel being currently produced is being currently consumed" was expressed by T. M. Girdler, chairman, Republic Steel Corp., Cleveland.

"The surplus is being tucked away in stock," continued Mr. Girdler. "'Protective buying' is the new term coined to describe the procedure . . . Better operation of priorities should do much to straighten out the tangle."

The speaker traced the steel capacity expansion recently completed or now underway and called attention to OPM's plan to add still another 10,000,000 tons.

"It is important to note, however, in connection with this proposed expansion, that the shortage of scrap grows more acute every day, and threatens seriously to hamper full operations of existing ingot capacity, to say nothing of another 10,000,000 tons. Just how that problem is to be met and solved in time for greatly added steel capacity to be of use within the next two or three years, when the defense program is expected to reach its peak, is not clear."

Steel Ingot Statistics

	Estimated Production—All Companies								Calculated weekly production, all companies Net tons	Number of weeks in month
	—Open Hearth—		—Bessemer—		—Electric—		—Total—			
	Net tons	Per cent of capacity	Net tons	Per cent of capacity	Net tons	Per cent of capacity	Net tons	Per cent of capacity		
Based on Reports by Companies which in 1940 made 92.91% of the Open Hearth, 100% of the Bessemer and 85.82% of the Electric Ingot and Steel for Castings Production										
1941										
Jan. . .	6,276,429	99.1	451,637	76.0	200,019	91.0	6,928.085	96.9	1,563,902	4.43
Feb. . .	5,673,289	99.2	378,330	70.5	186,281	93.9	6,237,900	96.6	1,559,475	4.00
Mar. . .	6,461,936	102.0	460,169	77.4	209,536	95.4	7,131,641	99.7	1,609,851	4.43
1st quar	18,411,654	100.1	1,290,136	74.8	595,836	93.4	20,297,626	97.8	1,578,353	12.86
Apr. . .	6,135,941	100.0	395,009	68.6	225,999	106.2	6,756,949	97.6	1,575,046	4.29
May . .	6,365,172	100.5	444,361	74.8	243,705	110.9	7,053,238	98.7	1,592,153	4.43
June .	6,103,767	99.5	458,242	79.6	238,721	112.2	6,800,730	98.2	1,585,252	4.29
2nd qtr	18,604,880	100.0	1,297,612	74.3	708,425	109.8	20,610,917	98.2	1,584,237	13.01
1st half	37,016,534	100.1	2,587,748	74.5	1,304.261	101.6	40,908,543	98.0	1,581,312	25.87
July . .	6,089,859	96.6	489,239	85.0	242,584	87.4	6,821,682	93.4	1,543,367	4.42
Aug. .	6,243,100	96.6	495,523	85.9	262,334	94.4	7,000,957	95.7	1,580,351	4.43
Sept. .	6,058,731	97.0	500,687	89.8	260,288	96.9	6,819,706	96.4	1,593,389	4.28
3rd qtr	18,391,690	96.0	1,485,449	86.8	765,206	92.9	20,642,345	95.2	1,572,151	13.13
9 mos.	55,408,224	98.7	4,073,197	78.6	2,069,467	98.2	61,550,888	97.0	1,578,228	39.00
Based on Reports by Companies which in 1940 made 98.43% of the Open Hearth, 100% of the Bessemer and 85.82% of the Electric Ingot and Steel for Castings Production										
1940										
Jan. . .	5,356,444	85.7	285,447	56.1	122,832	77.0	5,764,723	83.4	1,301,292	4.43
Feb. . .	4,208,249	72.1	205,458	43.2	112,090	75.2	4,525,797	70.0	1,093,188	4.14
Mar. . .	4,078,843	65.3	191,568	37.6	118,772	74.5	4,389,183	63.5	990,786	4.43
1st quar	13,643,536	74.4	682,473	45.7	353,694	75.6	14,679,703	72.3	1,129,208	13.00
Apr. . .	3,808,031	62.9	176,419	35.8	116,024	75.1	4,100,474	61.2	955,821	4.29
May . .	4,583,771	73.4	258,741	50.8	125,270	78.5	4,967,782	71.8	1,121,395	4.43
June .	5,222,120	86.3	305,115	61.9	130,208	84.3	5,657,443	84.5	1,318,751	4.29
2nd qtr.	13,613,922	74.2	740,275	49.5	371,502	79.3	14,725,699	72.5	1,131,875	13.01
1st half	27,257,458	74.3	1,422,748	47.6	725,196	77.4	29,405,402	72.4	1,130,542	26.01
July . .	5,269,701	84.5	322,567	63.5	132,357	83.2	5,724,625	83.0	1,295,164	4.42
Aug. . .	5,670,932	90.8	369,770	72.6	145,681	91.3	6,186,383	89.5	1,396,475	4.43
Sept. .	5,535,198	91.7	365,289	74.2	155,759	101.1	6,056,246	90.6	1,415,011	4.28
3rd qtr.	16,475,831	89.0	1,057,626	70.1	433,797	91.7	17,967,254	87.7	1,368,412	13.13
9 mos.	43,733,289	79.2	2,480,374	55.1	1,158,993	82.2	47,372,656	77.5	1,210,339	39.14
Oct. . .	6,059,792	97.0	408,317	80.2	176,433	110.6	6,644,542	96.1	1,499,897	4.43
Nov. . .	5,872,162	97.1	420,448	85.3	176,497	114.2	6,469,107	96.6	1,507,950	4.29
Dec. . .	5,907,840	94.8	399,434	78.6	188,083	118.2	6,495,357	94.1	1,469,538	4.42
4th qtr.	17,839,794	96.3	1,228,199	81.3	541,013	114.3	19,609,006	95.6	1,492,314	13.14
Total. .	61,573,083	83.5	3,708,573	61.7	1,700,006	90.3	66,981,662	82.1	1,281,210	52.28

The percentages of capacity for 1940 are calculated on weekly capacities of 1,410,130 net tons open hearth, 114,956 net tons Bessemer and 36,011 net tons electric ingots and steel for castings, total 1,561,097 net tons; based on annual capacities as of Dec. 31, 1939 as follows: Open hearth 73,721,592 net tons. Bessemer 6,009,920 net tons, electric 1,882,630 net tons.

The percentages of capacity operated in the first six months of 1941 are calculated on weekly capacities of 1,430,102 net tons open hearth, 134,187 net tons bessemer and 49,603 net tons electric ingots and steel for castings, total 1,613,892 net tons; based on annual capacities as of Dec. 31, 1940 as follows: Open hearth 74,565,510 net tons, bessemer 6,996,520 net tons, electric 2,586,320 net tons. Beginning July 1, 1941, the percentages of capacity operated are calculated on weekly capacities of 1,459,132 net tons open hearth, 130,292 net tons bessemer and 62,761 net tons electric ingots and steel for castings, total 1,652,185 net tons; based on annual capacities as of June 30, 1941 as follows: Open hearth, 76,079,130 net tons, bessemer 6,793,400 net tons, electric 3,272,370 net tons.

More Power For Ferroalloy Expansions

NIAGARA FALLS, N. Y.

■ WITH widespread expansion of ferroalloy plants underway in this area, in addition to many new ones recently completed, the Adams Station of the Niagara Falls Power Co. is gradually allocating power to those plants as directed by the Federal Power Commission.

To fill the need for additional 25 cycle hydro-generating capacity to supply electrochemical and electrometallurgical plants here, an additional 5000 cubic feet of water per second from the Niagara River was granted under an emergency permit from the commission, and the Adams Station, which had been used only for reserve service for 17 years, resumed regular service. Ten original Westinghouse waterwheel generators have been placed in regular operation.

The additional water diversion will make available 64,000 kilowatts of power. Many plants have not yet completed their expansions and up to Sept. 29 only 40,000 kilowatts of the available supply was being used. Industrial plant expansion now underway will soon be completed to make use of the remaining 24,000 kilowatts.

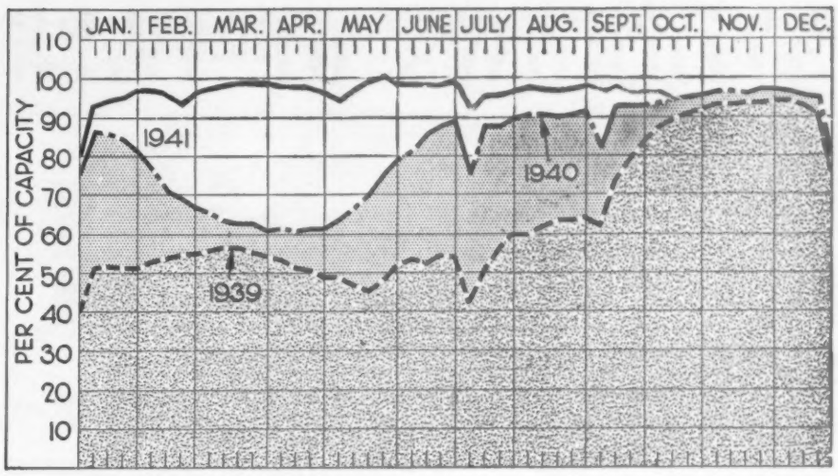
Could Produce More

The Adams Station is still not permitted to take enough water to produce at capacity. If an additional 7500 cubic feet per second were allowed, the station would be capable of producing 30,000 kilowatts more. Officials of the Buffalo Niagara Electric Co. said this maximum power capacity can be made available just as soon as needed water diversion is authorized. Officials also pointed out that there is no reason to believe any power shortage will develop in these parts due to the rapid expansion of plants.

The commission so far has made the following allotments of power:

Aluminum Co. of America, 1200 kilowatts; Carborundum Co., 5000; General Abrasive Co. Inc., 700; Great Lakes Carbon Corp., 3400; Hooker Electro-chemical Co., 2400; Innis, Speiden & Co., 100; International Graphite & Electrode Corp., 2000; National Carbon Co. Inc., 4000; Niagara Alkali Co., 1400; Niacet Chemicals Corp., 900; Oldbury Electrochemical Co., 1400; Pittsburgh Metallurgical Co., 7400; Titanium Alloy Mfg. Co., 4200; Union Carbide Co., 16,000 and Vanadium Corp. of America, 14,000.

Practically all have either recently completed or have under way expansion programs.



PRODUCTION . . . . Down

■ PRODUCTION of open-hearth, bessemer and electric furnace ingots last week dropped 1½ points to 94½ per cent, because of a two-day strike at Gary works of Carnegie-Illinois Steel Corp. Seven districts increased production, two declined and three were unchanged. A year ago the rate was 94½ per cent; two years ago it was 89½ per cent.

Youngstown, O. — Changes in active steel-producing equipment brought no change in output, the rate remaining at 98 per cent, with the same schedule for this week. Three bessemers and 76 open hearths are active. Construction of Republic Steel Corp.'s new blast furnace may start in about 30 days.

Chicago — Down 9½ points to 92 per cent as result of two-day strike at Carnegie-Illinois Steel Corp. plant at Gary. Schedule had been for 101 per cent. Only two of 48 open hearths remained in operation, with five of 12 blast furnaces.

Cleveland — Gained ½-point to 98 per cent.

Cincinnati — Addition of an open hearth caused a rise of 1 point to 82 per cent. Four furnaces are idle.

Detroit — With only two open hearths idle the rate rose 2 points to 91 per cent. Expected curtailment by Great Lakes Steel Corp. because of scrap shortage was averted.

Birmingham, Ala. — Unchanged at 95 per cent, with 23 open hearths in production.

St. Louis — Production continued at 83 per cent but scrap scarcity threatens one mill with reduction within three weeks.

Buffalo — Relighting of an open hearth by Republic Steel Corp. raised the rate 2½ points to 93 per cent. Other producers continued unchanged.

Central eastern seaboard — Removal of one open hearth last week caused a drop of 1 point to 93 per cent. Scrap shortage may force dropping another furnace this week.

New England — Resumption of repaired open hearths brought an increase of 7 points to 90 per cent.

Pittsburgh — Rose 1 point to 99 per cent as added capacity was brought into activity.

Wheeling — Advanced 2 points to 96 per cent.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Oct. 11	Change	Same week 1940	Same week 1939
Pittsburgh	99	+ 1	88.5	86
Chicago	92	— 9.5	98	87.5
Eastern Pa.	93	— 1	93	68
Youngstown	98	None	88	94
Wheeling	96	+ 2	97	93
Cleveland	98	+ 0.5	88	90
Buffalo	93	+ 2.5	90.5	88.5
Birmingham	95	None	97	90
New England	90	+ 7	92	90
Cincinnati	82	+ 1	90	86
St. Louis	83	None	82.5	74.5
Detroit	91	+ 2	96	98
Average	94.5	— 1.5	94.5	89.5

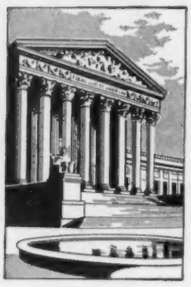
Cleveland Plants Cited For Beauty, Efficiency

■ Three new Cleveland metalworking plants have been awarded certificates by the Cleveland Chamber of Commerce for architectural beauty and engineering efficiency. Plants are those of the Lakeside Steel Improvement Co., Warner & Swasey Co. and the Cleveland Pneumatic Tool Co.

Before making the awards, the chamber made a survey of 157 new industrial buildings.

Windows of *WASHINGTON*

New division organized in OPM to direct 10,000,000-ton steel ingot capacity expansion . . . Defense agency approves Berlin dam in Mahoning valley to supply more water for third largest steel producing area . . . Priorities compliance in aluminum foundries checked by Labor Department inspectors . . . Nondefense manufacturers capable of making defense material certified to War Department



By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ W. A. HAUCK has organized a new expansion division to handle the proposed 10,000,000-ton steel expansion program and prepare information to be approved by W. S. Knudsen and forwarded to the Defense Plant Corp. for final action on loans.

Official name of the new group is the Steel Expansion Division of the OPM Iron & Steel Branch. Mr. Hauck has some 20 experts who will assist him in his work.

Included are: Herbert W. Graham, Jones & Laughlin Steel Corp., specializing in bessemer; Henry W. McQuaid, Republic Steel Corp., on alloy steel; George Hacker, Bethlehem Steel Co., forging and armor plate; George Vreeland, National Steel Corp., finishing mills.

Harry W. Bryant, Youngstown Sheet & Tube Co. is another expert with the Hauck division and is the chief of what is being termed the equipment expediting division.

Others include: Frank W. Chambers, Koppers Co.; Leonard Rogers, formerly of Republic; and B. C. Moise, formerly with National Tube Co., who will be an analyst for capacity and production.

OPM Recommends New Dam For Mahoning Valley

Construction of the $7,000,000 Berlin dam on the Mahoning river 10 miles northeast of Alliance, O., has been recommended to the War Department by OPM.

The Mahoning valley, which extends approximately 30 miles through Youngstown, O., to the Pennsylvania line, is the third largest steel center in the United States. The eight companies whose plants line the valley represent 10 per cent of the nation's steel capacity.

Constant losses in production due to lack of water have been reported to the OPM, the report says, and no other sources are available. The dam would assure a steady supply of 165,000,000 gallons a day for these plants which would allow steel production in the valley to go forward without delay, according to the report.

It is understood action on construction could be started immediately upon War Department approval.

Price Ceiling on Zinc Raised One Cent by Price Administrator

Price schedule establishing a maximum of 8.25 cents per pound for prime western zinc, f.o.b. East St. Louis, and 9.25 cents, delivered basis, for high grade zinc, is being prepared by the Office of Price Administration.

Leon Henderson, administrator, said "this action represents a case where intensive study by the OPA staff has disclosed that a price increase is necessary to maintain and expand supplies."

Present prices are 7.25c for prime western and 8.25c for high grade zinc, which have prevailed under an informal understanding with zinc producers since October, 1940.

The new maximum prices will contain appropriate differentials for other grades and become effective immediately. In the case of products where zinc is a substantial element in the cost of production, any producers who feel that an increase in price is essential should consult with OPA before taking action.

Washer, Ironer Manufacturers Certified to War Department

Thirty-four manufacturers of washers and ironers last week were certified to the War Department by OPM as capable of producing defense equipment, in a move to transfer nondefense facilities to defense production and to avoid "priorities unemployment."

OPM said these manufacturers can produce at least 17 defense items ranging from antiaircraft

Highspots of the Week's Washington News

SPAB takes full control of all construction, private and public, to conserve critical materials.

Scrap iron and steel placed under full priority control, effective Oct. 11; Henderson says present price schedule to be maintained and enforced.

Zinc price ceiling raised one cent.

Fire fighting equipment manufacturers asked to reduce consumption of critical materials; types of equipment limited.

Utility maintenance and repair rating plan may be used by "co-operative" or membership utilities.

Carbon steel and low-alloy steel castings price schedule in preparation; panel of 20 named to discuss schedule with OPA.

Wage-Hour inspectors check aluminum foundries for compliance with priorities regulations.

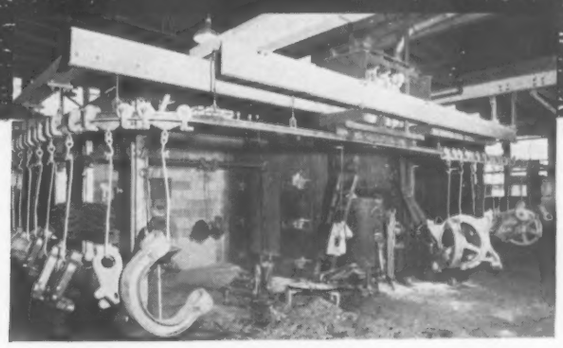
Machine tool builders accused of fixing prices on ground hobs.

Commercial airlines permitted to order 228 transports for 1942 delivery.

The Keynote of Manufacturing Today is **EFFICIENCY**

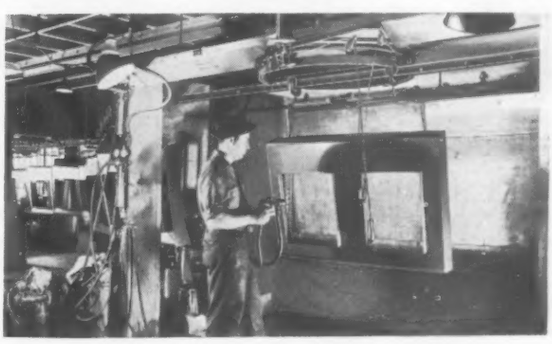
AMERICAN MONORAIL

OVERHEAD HANDLING EQUIPMENT



★ Heavy castings easily handled. Track section in center lowers to engage hook with load.

WASTE is out . . . in time, materials and man power. American MonoRail Overhead Handling Equipment has proven to hundreds of manufacturers to be the real answer to materials handling efficiency. Regardless of the type of business, there is a system suited to your problems. If you have a difficult or a costly handling operation, why not let an American MonoRail Engineer suggest a solution. Many times our engineers have solved problems that others claim "can't be done." Definite recommendations will be made and a detailed plan submitted showing just how an American MonoRail system can carry your product at the lowest possible cost and the highest possible efficiency. This service is without cost or obligation. Write us today.



★ Large parts sprayed quickly without re-handling. Turntable in track allows complete access.

★ Inexpensive MonoRail crane saves valuable time in tool and die shop.

Write for copy of "Blue Book" showing hundreds of illustrations.

THE AMERICAN MONORAIL CO.

13102 ATHENS AVENUE **CLEVELAND, OHIO**

gun mounts to bomb fin assemblies. It pointed out that a sizeable order for one such item would absorb the bulk of unemployment to be caused by restrictions on the raw materials available for nondefense manufacture.

The Nineteen Hunded Corp., Apex Electrical Mfg. Co. and the Easy Washing Machine Corp. were certified as capable as serving as prime contractors.

Recommend Rehabilitation of Chester, Pa., Blast Furnace

Rehabilitation of the blast furnace at Chester, Pa., which has been out of production for the past 12 years has been recommended by OPM.

Project report was prepared by W. A. Hauck, steel consultant, and forwarded by OPM Director-General Knudsen to Chairman Jesse Jones of the RFC for final action.

The Pittsburgh Coke & Iron Co. proposes to operate the furnace under a lease arrangement and has the necessary facilities to supply it with coke and ore, according to the report. It is estimated the furnace will produce from 120,000 to 144,000 tons of pig iron yearly and production can be started within four to six months after approval is given.

SPAB Approves Construction Of Commercial Airplanes

Acting with the approval of the War Department and the OPM aircraft branch, SPAB has approved a program under which aircraft manufacturers may accept civil orders for the construction of commercial transport planes.

Covering the 18-month period beginning Jan. 1, 1942, the program provides for the construction and delivery of 156 DC-3s, 52 Lockheed Lodestars and 20 DC-4s.

Construction and delivery of the planes is subject to the following provisions: if the Army needs the planes on their completion it may have them; if while they are being built their construction interferes in any way with the construction of Army planes or other goods for the Army, the Army orders are to have the right of way. In addition, the planes will be built with special reinforced flooring and with wide doors so that they may be immediately adapted to use as military transport planes in case of need.

Defense Plant Expansion Costs Total $4,725,786,000

Estimated cost of 2756 defense industrial plant expansions approved through Aug. 31 totaled $4,725,786,000, according to OPM. This represented approval of certificates during August covering an estimated $533,291,000 of new facilities, an increase of 13 per cent over the July 31 figure.

At the end of August there were 575 expansions for which public funds had been committed—516 representing United States government commitments, and 59 representing commitments of foreign governments. The estimated cost of these projects was $3,783,807,000, or 80 per cent of all reported defense plant expansions.

On the same date there were 2181 privately financed plant expansions for which certificates of necessity had been approved, estimated to cost $941,979,000, or 20 per cent of the total.

New System Instituted To Check Priorities Unemployment

A new system of reporting, to check quickly on serious cases of priorities unemployment, has been set up by the OPM Labor Division and the United States Employment Service.

The 1500 public employment offices have beepn directed to make immediate reports of layoffs or shortening of average weekly hours of work, caused by shortages of materials or parts or because of a government curtailment order. A separate report will be made for each plant so affected.

Each report made will be sent to the Washington office of the U. S. Employment Service for the information of the OPM Labor Division, with copies to the OPM Regional Labor Supply Committee, the nearest office of the OPM Division of Contract Distribution, and the state employment service headquarters.

This will enable state and federal agencies concerned to keep currently abreast of the developments in priorities unemployment.

Where the reports indicate the possibility of serious unemployment in the community, more detailed surveys will be made as the basis of possible certification of the affected community for special preference in the awarding of defense contracts and subcontracts.

Reports are to be filled out and sent in by local employment offices, whenever either of the two following situations has arisen because of shortages of material or parts or because of a government curtailment order.

1—A total of 50 or more workers are scheduled for lay-off or have been laid off (and not rehired or replaced) during the preceding three months.

2—The average weekly hours of work of a total of 200 or more workers are scheduled to be reduced 10 hours or more, or have been reduced that amount (and not restored) during the preceding three months.

Limit Use of Critical Materials In Fire-Fighting Equipment

Restrictions on the use of critical materials in the construction of fire-fighting equipment were announced last week by Douglas C. MacKeachie, OPM director of purchases. Program is designed to eliminate nonessential trimmings and gadgets, but will not impair the efficiency of fire-fighting units.

Program was worked out by the Purchasing Division fire equipment section after many conferences with manufacturers. Manufacturers are requested:

1—Not to make or deliver sedan-type fire engines, quintuple-type machines, service ladder trucks or squad, salvage and reserve cars. (The work done by all of these cars

Government Forms Are Available

■ Forms PD-73, PD-25-C, PD-25-D which now must be attached to every order or contract for defense supplies are available to STEEL's readers, shipments being made 24 hours after orders are received.

These forms can be obtained from STEEL, Readers' Service Department, Penton Building, Cleveland, at the following prices:

Quantity of		Quantity of	
100	$1.00	1,000	$3.55
200	$1.50	2,500- 5,000	$3.25 per M
300	$2.00	5,000-10,000	$2.95 per M
400	$2.50	10,000-20,000	$2.75 per M
500	$3.00	20,000 and over	$2.55 per M

NOTE: Postage is not included in above prices. If your order originates in Ohio, please include sales tax.

can be performed by other types of equipment, and cutting the number of lines means a reduction in the quantities of material used).

2—Not to make or deliver any pumpers except those falling in three classes, the classes being defined by gallons-per minute delivery of water, on the underwriters' rating. This will substantially reduce the number of models made and will stop production on many small types of pumpers which are considered uneconomic.

3—Not to make forest-fire trucks, crash trucks or booster tank trucks having tank or pump capacity above certain specified limits.

4—Not to include a bell on any equipment hereafter made or delivered. An ordinary siren will do the job.

5—Not to make or deliver any equipment containing specified strategic metals in quantities above the minimums laid down in the program.

Program does not apply to equipment which was under construction on special order on Oct. 6 and for which 75 per cent of the scarce materials, as called for in the specifications contained in the special order, was already in the manufacturer's possession. Provision is made that a manufacturer who feels that any aspect of the program will result in undue hardship may state his case before the fire equipment section.

Co-operative Utility Companies May Use Maintenance Plan

Co-operative utility companies may use the priority assistance provided in Preference Rating Order P-46 (the maintenance, repair and supplies plan for utilities), according to an interpretation issued by the Division of Priorities.

Since the original plan was issued for certain utilities, a number of questions have been received as to whether or not the assistance can be used by co-operative or "membership" companies supplying services to their stockholders or members only.

Interpretation states that such companies are included in the order, provided that the company offers service within its service area to any person applying for it in accordance with the producer's rules and regulations.

Fowler Hamilton in Charge of Scrap Industry Investigation

Fowler Hamilton, attorney in the antitrust unit of the Department of Justice, has been placed in charge of the department's investigation of the iron and steel scrap industry. His appointment marks the third time attorneys in charge have been changed in the few weeks since the investigation was started.

Emergency Property Seizure Bill Approved by Congress

Congress has passed the emergency property seizure bill and sent it to the President. Bill as finally approved by both houses is modified from the form in which it was originally introduced at the request of the Administration.

In the final version, the President is authorized to requisition military and naval equipment, and supplies, munitions and similar articles, but is not empowered to seize machinery and equipment actually in use by an operating firm or business when it is indispensable for the continued operation of that plant.

The government is required to pay "fair and just compensation" for the commandeered property. The power of seizure expires June 30, 1943, or when the President declares the emergency ended, if that date comes first.

Bill provides for the return of property to the original owners if the President decides it is no longer needed for defense and if the owner pays a fair price for it.

Wage-Hour Inspectors Check Priorities Rules Compliance

Inspectors from the Wage and Hour Division of the Labor Department last week started a nationwide check of aluminum foundries to ascertain whether regulations of the OPM Priorities Division were being observed. The investigation was undertaken at the request of Priorities Director Nelson.

The inspectors are using the same procedure employed for wage-hour surveys and the routine is uniform in all cases.

The Priorities Division said information at hand indicates a number of violations have occurred. Certain manufacturers have used preference ratings to obtain critical materials subsequently used in non-defense products. In other cases, division spokesmen said, ratings have been used to accumulate inventories.

Number of willful violators, however, is believed to be small.

Committee Named To Study Price Schedule on Castings

Advisory panel from the carbon steel castings industry was appointed last week by OPA to discuss the forthcoming price schedule on carbon and low-alloy castings. Representatives of the panel have met with OPA.

Members of the panel include: Oliver E. Mount, American Steel Foundries; J. A. Sauer, Symington Gould Corp.; D. C. Bakewell, Blaw-Knox Co.; Clarence Tolan, Dodge Steel Co.; Lee C. Wilson, American Chain & Cable Co.; A. M. Andorn, Penn Steel Castings Co.; T. H. Harvey, Ohio Steel Foundry Co.; Carl F. Clarke, Monroe Steel Castings Co.; Frank M. Robbins, Ross Meehan Foundries; C. L. Snowden Jr.; Reliance Steel Castings Co.; G. W. Harrison, Harrison Steel Castings Co.; Harold F. Dunbar, McConway & Torley Corp.; Charles P. Whitehead, General Steel Castings Corp.; W. H. Worrilow, Lebanon Steel Foundry; E. L. Knight, Pacific Car & Foundry Co.; Cyrus Hankins, Unitcast Corp.; G. T. Johnson, Buckeye Steel Castings Co.; T. H. Shartle, Texas Electric Steel Castings Co.; James A. Slater, National Malleable & Steel Castings Co.; and W. A. Spuehler, Burnside Steel Foundry Co.

Machine Tool Builders Accused Of Fixing Ground Hob Prices

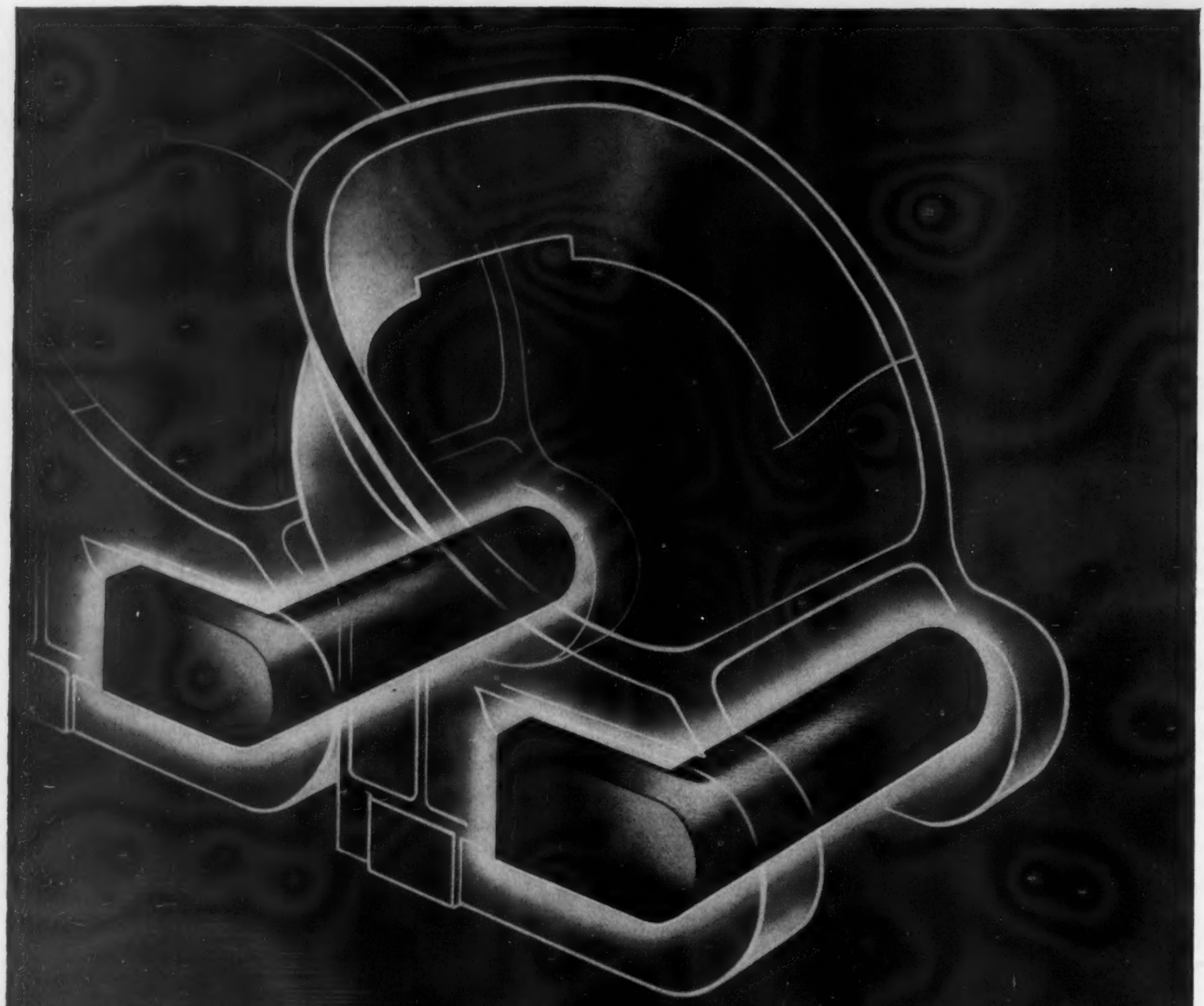
Department of Justice last week instituted court action to enjoin seven machine tool manufacturers from fixing prices on ground hobs in violation of the Sherman antitrust law.

Defendants are Barber-Colman Co., Rockford, Ill.; Illinois Tool Works, Chicago; Michigan Tool Co., Detroit; National Twist Drill & Tool Co., Detroit; National Tool Co., Cleveland; Union Twist Drill Co., Athol, Mass.; and Brown & Sharpe Mfg. Co., Providence, R. I. The action was filed in the United States District Court for the Northern District of Illinois at Chicago.

Ground hobs are steel tools ground to a precision finish and used on milling and hobbing machines to cut gear teeth. They are used extensively throughout the United States in the manufacture of accurately meshed, noiseless gears for automobiles, airplanes, trucks, armored cars, tanks, heavy artillery, and machine tools.

Defendant manufacturers, the bill charges, have patents on machines for making ground hobs and on methods of grinding hobs, but ground hobs themselves are not patented. Substantially all of the ground hobs produced in the United States are made by the defendants.

Complaint charges that the defendants agreed that the defendant manufacturers would not sell ground hobs for less than prices established by the defendant Barber-Colman Co. The complaint further alleges that the defendant manufacturers on several occasions increased their prices for ground hobs in accordance with instructions from the defendant Barber-Colman Co.



Dredge bucket pins demand a lot from steel—and get it in Chromium-Molybdenum (4142)

Dredge bucket pins are heavy (4-8 inches diameter), must withstand heavy static and impact loads, and must have extra good wear resistance. It is a tough assignment for any steel.

A Chromium-Molybdenum (4142) steel developed for uniform hardness in heavy sections has recently been specified for this application. It has proved its worth in service.

Here is a new, permanent place for one of the most versatile of alloy steels—a steel that, with minor variations in carbon and manganese content, is meeting requirements in parts ranging from 0.065" wall aircraft tubing to 12" diameter shafting. This steel, together with many other Molybdenum Steels, is covered in detail in our technical book "Molybdenum in Steel". A copy will be sent on request.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.
MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • CALCIUM MOLYBDATE

Climax Molybdenum Company
500 Fifth Avenue • New York City

MOLY

Mirrors of *MOTORDOM*

New cars are on the market—so what?—appears to be general reaction after a month of production . . . Scrap shortage critical, but steel mills resort to innovations to keep open hearths melting. Collection of more remote material urged. Plants are refining salvage programs . . . Refrigerated welding electrodes reduce amount of pickup in spot welding aluminum . . . Regulations drawn up for transfer of employes

By A. H. ALLEN
Detroit Editor, STEEL

DETROIT

■ IT WOULD not be strictly accurate to say the automotive industry is limping into its 1942 model season, but the snappy stride in evidence last fall is lacking this year. Crowds in dealers' showrooms are sparse; interest in closing deals for new cars, both on the part of dealers and buyers, is lackadaisical. Uncertainty over exact prices to be quoted is prevalent. Allowances on used cars have not kept step with advancing prices of new cars.

At the motor plants, interruptions to the smooth flow of new model production have been continuous. Troubles with fit of parts have been numerous and many of the new cars on showroom floors now are no shining examples of the industry's expertness at manufacturing. Small details such as fits of hoods, fenders, luggage compartment doors and the like appear to have been hurried over in the effort to get the cars off the line. They will be corrected, true enough, but they are a part of the pall which has descended over the building and selling of cars, the natural outgrowth of overtime concentration on tooling for defense.

Even the advertisements for new cars have lost to some degree the zest and sparkle of other years. Advertising agency budgets have been trimmed in the face of curtailed production, so the axe has been applied to many of the four-color engravings, and simple line drawings used in their stead.

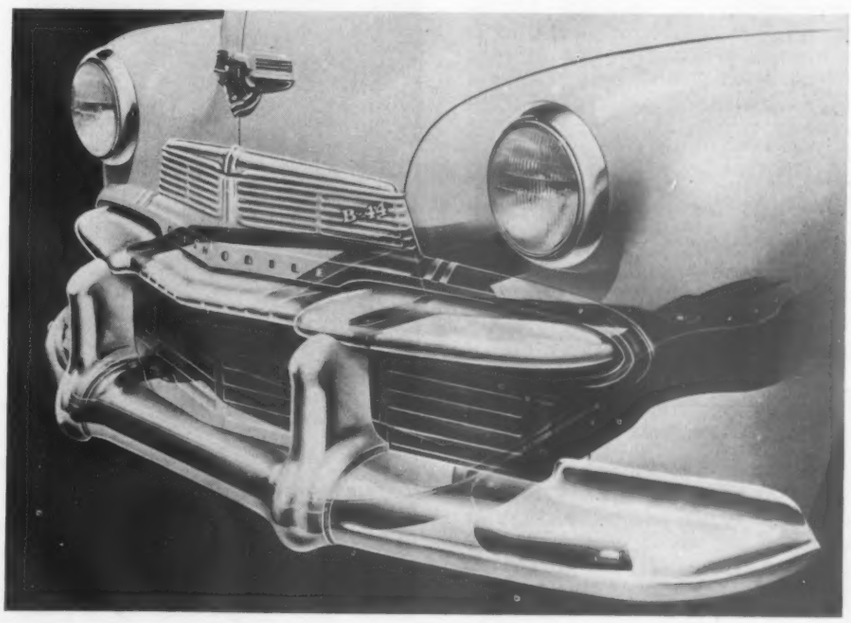
Reports are heard that some Washington officials are irate over the industry's extensive application of bright metal trim on new cars. They point to recent strong urgings for the industry to remove bright metal in the interest of conserving copper, nickel and chromium, and then to the first batch of 1942 models, and ask: Why?

The answer is simple, as anyone familiar with automotive purchasing and manufacturing methods knows. Present designs were approved and materials for them ordered early this year, before there was any thought of ordering bright metal trim off cars. Suppliers of plated parts had shipped to the motor companies initial releases of 1942 production long before the edict went out from Washington. Obviously there would have been no point to scrapping such finished parts just because the order was out for their removal. Until present stocks of such material are exhausted, they will appear on the new cars, and if government officials are irate, they have only their own ignorance of manufacturing methods as an antidote.

Boost Pig Iron in Open-Hearth Charges, Use Cinder

Shortage of iron and steel scrap reached an apparent critical stage here two weeks ago when Great Lakes Steel Corp. admitted being on the verge of taking off four of its 16 open-hearth furnaces. However, the furnaces did not go down as expected, and are still operating. Intake of scrap at the plant is estimated to be only one-third of the present rate of consumption and how much longer operations can be continued on this basis is a puzzler.

Meanwhile efforts are being made at Great Lakes to scrape up every piece of available scrap on the plant grounds, the percentage of pig iron used in open-hearth charges has been boosted appreciably, and iron cinder is being charged in open hearths in small amounts to relieve the pressure on scrap. When cinder is charged, an extra amount of limestone must be added along with it. Unconfirmed reports have been heard



■ **Rugged steel anchorage for the Oldsmobile double-deck double-duty bumper is disclosed in this phantom view of the front-end assembly for 1942 models. Both upper and lower horizontal bars are braced to the car frame**

that Great Lakes is receiving bundled scrap from Ford Motor Co. stocks as an emergency or stopgap measure.

Michigan's Governor Van Wagoner has launched a statewide campaign to reclaim and move scrap material from the farther reaches of the state, but present ceiling prices will not allow much expense for economical movement of such material.

All the motor companies have developed scrap salvaging and reclamation methods to a fine degree. Pontiac, for example, now has a scrap collection plant with 22,580 square feet of floor space, 8000 of it new. Here miscellaneous scrap is gathered from all departments of the plant, sorted, baled, boxed or barreled for reuse in the plant or for shipment over the salvage plant's spur track to outside concerns.

In the salvage building, 7 tons of waste paper is baled daily. Thousands of pieces of corrugated board and cartons are baled or recut for use in the shipment of service repair parts. Burlap bags are used to accommodate service parts. Nails are removed from old lumber, the boards trimmed and used for parts boxes.

Insulation is removed from old copper wire and the copper sold. Galvanized roofing from dismantled buildings likewise is sold for scrap. Structural steel is cleaned up and stored carefully for use by maintenance engineers.

Nearly all of the ferrous scrap collected is directed toward making the foundry more self-supporting. Of the 200,000 tons of iron poured so far in 1941, about 70,000 tons, or 32 per cent, represented salvage from various manufacturing divisions. Forty tons of sheet steel trimmings are baled daily for use in cupolas. Forty tons of steel chips and turnings are collected from motor and axle plants, deoiled in centrifuges, pulverized and briqueted for foundry use. Another 40 tons a day of iron borings from the motor plant is thus reclaimed. A large tumbling mill adjoins the foundry building, in which tons of sand mixed with gates, risers, fins and spilled iron are dumped for separation and reuse of the iron.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1939	1940	1941
Jan.	356,962	449,492	524,058
Feb.	317,520	422,225	509,326
March	389,499	440,232	533,849
April	354,266	452,433	489,854
May	313,248	412,492	545,355
June	324,253	362,566	546,278
July	218,600	246,171	468,895
Aug.	103,343	89,866	164,792
8 mos.	2,377,691	2,875,477	3,782,440
Sept.	192,679	284,583	.....
Oct.	324,689	514,374	.....
Nov.	368,541	510,973	.....
Dec.	469,118	506,931	.....
Year	3,732,718	4,692,338	.....

Estimated by Ward's Reports

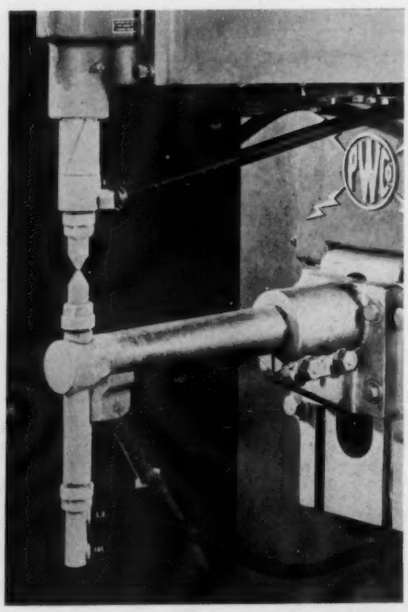
Week ended:	1941	1940†
Sept. 13	53,165	66,615
Sept. 20	60,560	78,820
Sept. 27	78,535	95,990
Oct. 4	76,820	105,153
Oct. 11	79,065	107,957

†Comparable week.

Frosty Electrodes Mean Fewer Point Dressings

Resistance welding of aluminum alloys and stainless steel is progressing rapidly under the stimulus of expanding needs of the aircraft industry. One of the difficulties incident to the use of this type of spot welding equipment, particularly on aluminum, is the excessive pickup of aluminum on copper alloy electrodes, necessitating frequent redressing and cleaning of electrodes, sometimes as often as every 100 welds. This is bothersome, costly and a deterrent to more extensive use of spot welding of aluminum alloys.

To meet this problem, a local builder of spot welding machines, Progressive Welder Co., has developed a line of refrigerating units for attachment to welding machines, said to make possible continuous welding of four to ten times as many spots in aluminum without requiring point dressing.



■ **Refrigeration of electrodes on machine for spot welding aluminum minimizes pickup of aluminum on electrode points, thereby speeding up welding operations. Note heavy coating of frost on electrodes which remains during welding cycles**

When used in combination with a spot welding machine, the refrigerating unit reduces electrode temperature to a degree where, in spite of the high heat necessary to produce a weld, electrodes will be covered constantly with frost. The reduction in temperature has increased point life so that 10-minute runs at a speed of 100 welds per minute are possible without point dressing in a three-phase aluminum spot welder.

Primary function of the refrigeration is to keep the welding point cool at the point of the contact, concentrating heat at the point of contact between the pieces being welded, where it is wanted. It is said that the use of refrigeration, plus a new harder and tougher tip material than that available hitherto, indicates a virtual elimination of all pickup of aluminum on the welding electrodes. The refrigeration units are made in three sizes, for a single welder, and for groups of two or four. They are provided with automatic thermostatic control, built-in dehydrator, heat exchanger, external indicating thermometer, variable-pressure pump and standard safety appliances.

Installation is simple, involving only disconnection of water lines to the electrodes and coupling of refrigerator inlet and outlet connections to the electrode water piping.

Double-Deck Bumpers on B-44

Oldsmobile has christened its 1942 line of cars the B-44 series. Interpretation of this is not that of a new bomber model, but simply that they are claimed the *B*est-looking and *B*est-*B*uilt cars in the company's 44-year history, which is a modest enough claim. The line includes two sixes and three eights, with a total of 15 body types. Distinctive touch on the Olds for 1942 is the front-end design, sporting a double-deck and double-duty bumper with two horizontal bars joined together with vertical bumper guards and the complete assembly anchored to the car frame.

Pistons are of cast pearlitic malleable iron, 42 per cent heavier than the same design in aluminum, and requiring heavier crankshaft and stiffer connecting rods in the 8-cylinder engine. Main and connecting rod bearings have a sintered copper-nickel matrix with thin babbitt overlayer.

■ Orders for steel boilers received in August totaled 1246, compared with 1601 in July and 1098 in August, 1940, according to the Bureau of the Census.

ICE-COLD WELDING NOW POSSIBLE

Speed Welding of Aluminum for Defense Products

DETROIT.—Even faster production-welding of aluminum than already made possible by Progressive Welder Company's 3-Phase aluminum welder is now forecast as the result of the adaptation of "refrigeration" to this machine. Continuous runs without point cleaning for 10 minutes at 100 welds a minute are no longer unusual as the result of the new development, compared with the usual 40 or 50 spots between point dressings.

Progressive Makes New Units Generally Available

DETROIT.—In view of their potential importance in defense production, Progressive Welder Company has announced that its new refrigerating units will not be limited to use with Progressive welding equipment but may be used with other makes of welding machines and for other materials besides aluminum.

Installation is said to be extremely simple since the units are self-contained and need merely be coupled to the normal cooling water connections of the electrodes.

The units are available in a range of sizes permitting the use of one unit to serve as many as four welding machines, if desired.

Refrigerating Units to Be Patented

DETROIT.—Patent applications have been filed by Progressive Welder Company on its new refrigerating unit for welders.

Refrigerating Units for Welders Announced

DETROIT.—Welding, at tip temperatures so low that electrodes are continuously covered with frost is the newest and "hottest" thing in welding, particularly the welding of aluminum.

Developed by Progressive Welder Company, of 3050 E. Outer Drive, the new units are said to make possible the welding of four to ten times as many consecutive spots without necessity of shutting the machine down for "dressing" the points.

Unretouched photo of tips taken immediately after a welding run.

Complete Information Offered

DETROIT.—Complete information on the new refrigerating units will be supplied on inquiry from:

PROGRESSIVE WELDER CO.
3050 E. Outer Drive, Detroit

In spite of the high temperatures required to perform the actual weld itself, electrodes are covered with frost almost to the very tip—even when welding aluminum at 100 welds a minute with the Progressive 3-Phase Aluminum Welder.

In operation the frost line moves up and down the electrode from the tip a mere 5/16 of an inch, every time a weld is made at this speed.

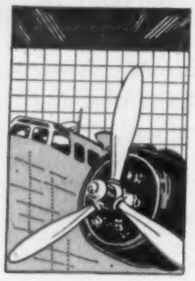
Progressive's 3-phase short wave aluminum welder (refrigerating unit is behind the welder.)

Refrigeration Unit Cuts Tip Pick-up

DETROIT.—Development of a commercial refrigeration unit for resistance spot welders is believed here to be the answer to tip "pick-up," especially in welding of aluminum, stainless, etc. The low temperature of the welding electrodes virtually eliminates the cause of tip pick-up, or partial "welding" of the tip to the material being welded.

—Advt.

WING TIPS



Staff of 6000 officers and civilians pushes engineering, procurement and servicing work of Army Air Corps at Wright Field where $25,000,000 plant nears full operation. . . . Production models instead of prototypes used for accelerated service tests, speeding up time between design and mass production of fighting planes. . . . Plan field service force of 40,000

■ NERVE center of U. S. Army aviation is bustling Wright Field, located some six miles northeast of Dayton, O., on a government reservation covering 4549 acres known formerly to the local citizenry as the Huffman prairie. Once a calm and leisurely headquarters for aviation engineering and development, employing about 1200 civilians and only a smattering of military officials, in the space of two years it has been transformed into a swarming focal point for all experimental development, procurement, production engineering, and field servicing of the Army Air Corps, with 5500 civilians rubbing shoulders in their daily routine and 500 officers supervising activity.

So rapid and complete has been the change at the field that old-time civilian employes rub their eyes in disbelief at such things as concrete test cells for mounting air engines as powerful as 8000-horsepower, a 20-foot wind tunnel through which a 40,000-horsepower motor will push a 400-mile-an-hour blast of conditioned air to test the guts of new plane models, and grandiose plans like that for building up a field service crew of 40,000 mechanics and engineers, directed by an organization called Maintenance Command, and ready to go in a moment's notice to any disabled American plane.

These things are no mere idle dreams. They are going ahead now, and with terrific emphasis on speed. The test cells, for example, and the wind tunnel will be operating by the first of the year, and new buildings to house the Maintenance Command are taking form. The stately air corps museum building has had its exhibits dismantled "for the duration" and is now spilling over with the expanded staff of the personnel department and other administrative groups. An old shed formerly used to garage employes' cars now bulges with hastily created offices for still other groups.

Calmly watching over the hectic scene on a grassy hill behind the field are several goats, which are used in experimental tests to determine the effect of reduced pressures and reduced oxygen supply on animals at high altitudes, in order to obtain information for developing equipment to be used by airmen at combat altitudes. Atop this hill is the Wright Brothers memorial park, contributed, along with the land for Wright field, by the citizens of Dayton as a landmark to the fame of Wilbur and Orville Wright who flew their early planes over this area shortly after their famous Kitty-hawk flights in 1903.

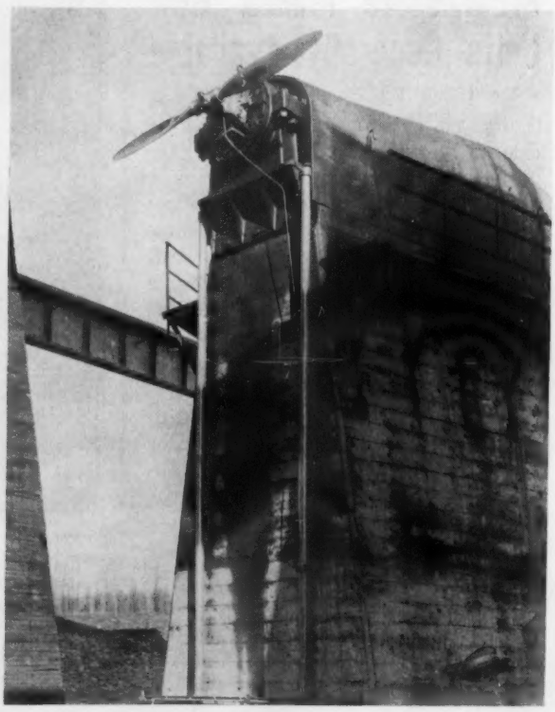
Five miles eastward is Patterson Field, also on the government reservation and currently the center of accelerated service testing being given to production plane models flown there from the plants of manufacturers.

Before Wright Field came into existence in 1927, the Army Air Service, as it was then known, maintained headquartetrs at McCook Field within the Dayton city limits. This test center was a creation of World War I and many of the veterans now at Wright Field got their start at McCook. First extensive night flying and landing tests were made there. McCook flyers established numerous speed and altitude records, and many of the early experts there now hold important posts in this country's aviation industries.

Normal Routine Gives Way to Emergency

Today Wright Field represents a physical plant investment of $25,000,000, and this solely for the Army Air Corps; the Navy's air arm is something else again. In trying to outline the functioning of the field

◆



■ Among new equipment installed at Wright Field, Dayton, O., for Army Air Corps test work, is this propeller test rig, one of the largest in the world, and capable of whirling the largest experimental propellers at speeds up to 4300 r.p.m. Power is supplied by electric motors, the largest being rated at 6000 horsepower

today, as most of the engineers there are quick to say, you have to keep in mind that "normally" things were done in a certain way—today this is all changed for speed.

"Normally" the Field staff acts as an initiating and directive organization, under the Chief of the Air Corps, for the development and procurement of Air Corps equipment, and maintains liaison connections with manufacturers during production. Engineers draw up a set of specifications, for instance, for a certain new type of plane. They call in the plane builders to get bids on the job. The plane builders take the "specs" back home and study them over, finally arriving at a suitable figure. Bids are opened and the low bidder is awarded an order for an experimental model or "prototype," as it is called. Before this, however, the builder usually supplies wind tunnel models and even a full-size "mockup." When the "X" model or test plane is built it is shipped to the Field, put through all sorts of static and flight tests, deficiencies noted and passed back to the manufacturer along with an order for, say, 13 planes of the type, or enough for test distribution among the tactical squadron of the Air Corps. These 13 units are put through approximately a year of service flying which usually results in some more design changes which are relayed back to the builder before quantity orders are awarded.

Obviously such a procedure is a time-consuming process and usually means about three years between the time the original specs are conceived and the plane is finally in what might be considered production. By that time an entirely new design concept usually is ready and the plane manufacturer can start from scratch again.

So today, in the face of the urgent demand for warplanes for both this country and Britain, Wright Field takes details from air corps observers stationed all over the world, quickly builds up suitable specifications for a new model, decides on which company is best equipped to build the plane, orders experimental and production models immediately, and grabs the first three planes off the production line for a rigid 150 hours of accelerated service tests at Patterson in which trained pilots do everything they can to shake the living daylights out of the craft, operating in continuous shifts around the clock. As weak points may be detected the data are relayed back to the manufacturer who must be prepared to make a quick shift in design details.

With this arrangement the time has been cut down to about a year between the first design of a new plane and the start of production. Naturally, as new ideas are incorporated in designs after production has started there is necessitated frequent changes by builders; hence the frequent new designations seen in current models of warplanes, such as the P-39-D, the fourth version of the Bell Airacobra, or the P-40 F, the sixth version of the Curtiss pursuit ship, the one incidentally in which the Packard Rolls-Royce Merlin engine was first installed.

(To be concluded)

Whitney Sees Aviation Keystone of Economy

■ End of the war "will mark the beginning of aviation as the keystone of American economy, trade and distribution," it was predicted last week by Cornelius Vanderbilt Whitney, chairman, Pan-American Airways. Speaking at the thirteenth annual Boston Conference on Distribution, at Boston, Mr. Vanderbilt discussed the increasingly dominant role aviation will play in the near future.

More than 700 business executives attended the conference and heard a special message from President Roosevelt calling for more "efficient and effective" distribution of consumer goods than ever before.

Thurman Arnold, assistant attorney general, asserted defense production has been hampered the past ten months by "powerful groups who fear expansion may destroy their domination of industry." These groups, he declared, were in the field of both labor and capital.

Aircraft Deliveries to Britain $284,000,000

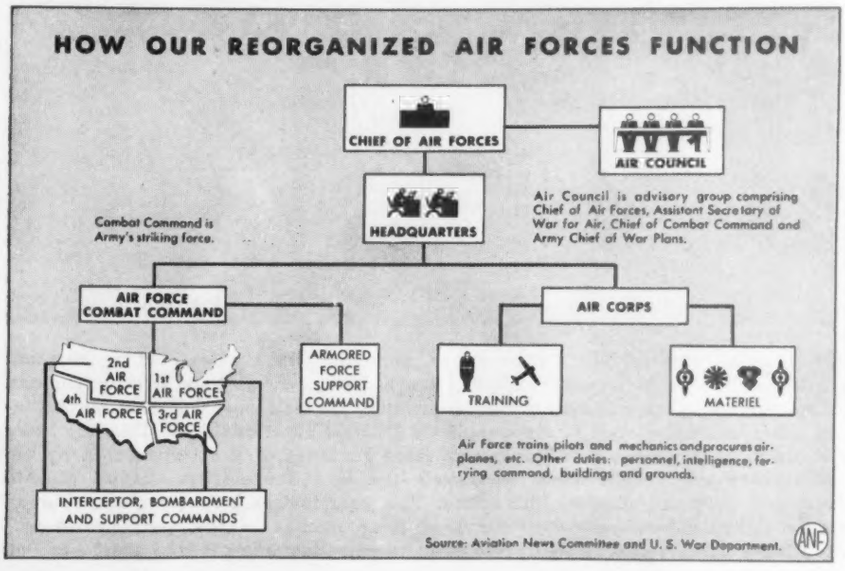
■ American aircraft manufacturers' deliveries of planes, engines and other aeronautical equipment to British forces throughout the world totaled more than $284,000,000 in the first seven months this year, it was reported last week by Col. John H. Jouett. President, Aeronautical Chamber of Commerce of America Inc., Washington, Colonel Jouett said a vast majority of these shipments were on original contract orders and only a small part thus far on lease-lend.

Plane, engine and propeller deliveries comprised more than $240.000,000 of the total shipments in the period. Three combat planes have been sent to the British air arm, he reported, for every trainer delivered.

"All in all, American aircraft manufacturers in the first seven months of 1941 sent the British nearly twice as many combat planes as the British lost in defending the British Isles, according to their own figures, during the entire year of 1940."

Military Plane Output In September 1914 Units

■ Military plane production in September has been reported as 1914 units, up 60 from the August total. No breakdown is given by types, but the following figures will provide a clue. Airplane, airplane engine and propeller plants in September totaled about 52,000,000 man-hours of production or, dividing by the production figure, about 27,200 man-hours per plane unit. A pursuit ship of the Bell Airacobra type calls for, roughly, 15,000 man-hours of work, including engine and propeller; a bomber of the Consolidated B-24 type (four engines) takes about 150,000 man-hours. Thus it is seen that military plane production is predominantly pursuit ships, with perhaps a sprinkling of medium bombers and a dash of heavy bombers.


HOW OUR REORGANIZED AIR FORCES FUNCTION
CHIEF OF AIR FORCES
AIR COUNCIL
HEADQUARTERS
Air Council is advisory group comprising Chief of Air Forces, Assistant Secretary of War for Air, Chief of Combat Command and Army Chief of War Plans.
Combat Command is Army's striking force.
AIR FORCE COMBAT COMMAND
AIR CORPS
2nd AIR FORCE
1st AIR FORCE
4th AIR FORCE
3rd AIR FORCE
ARMORED FORCE SUPPORT COMMAND
TRAINING
MATERIEL
Air Force trains pilots and mechanics and procures airplanes, etc. Other duties: personnel, intelligence, ferrying command, buildings and grounds.
INTERCEPTOR, BOMBARDMENT AND SUPPORT COMMANDS
Source: Aviation News Committee and U. S. War Department.
ANF

$71,101,747 National Defense Contracts Placed in Week by War Department

■ DEFENSE contracts reported last week by the War Department totaled $71,101,747. Most awards were small and represented the wider distribution of defense work progressively taking place. Ordnance Department again placed the largest number of contracts for products manufactured by the metals industries. Orders reported include:

Ordnance Department Awards

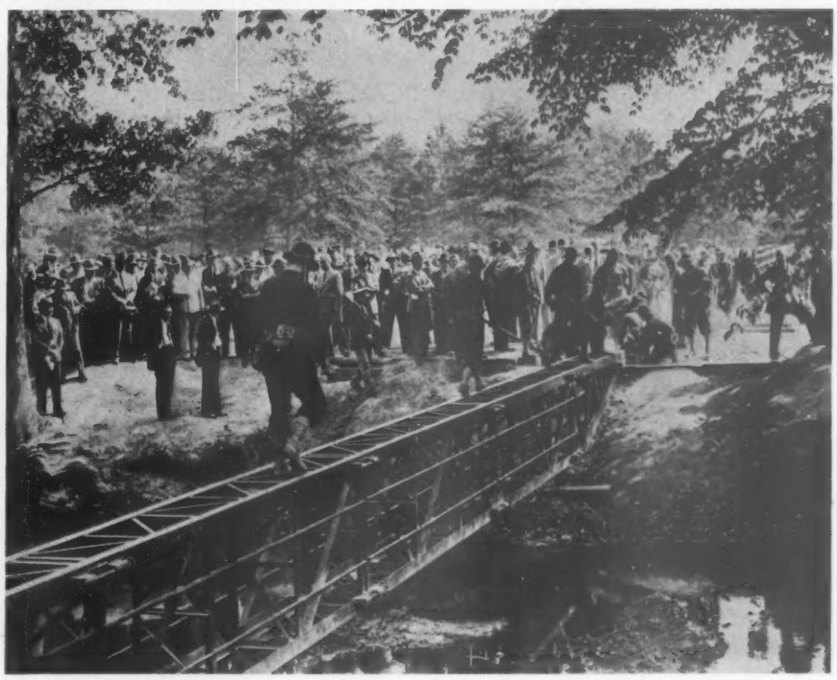
Adirondack Foundries & Steel Inc., Watervliet, N. Y., castings, $8614.07.
Aetna-Standard Engineering Co., Youngstown, O., assemblies, $15,000.
Allegheny Ludlum Steel Corp., Brackenridge, Pa., heat treating suspension device plates, steel, $16,689.30.
Allis-Chalmers Mfg. Co., Milwaukee, parts for tractors, $30,200.50.
American Brass Co., Waterbury, Conn., brass, wire, $7705.97.
American Car & Foundry Co., New York, parts for tanks, firing mechanisms, $179,412.90.
American Chain & Cable Co. Inc., Detroit, cables and fittings, $2374.24.
American Foundry Equipment Co., Mishawaka, Ind., parts for wheelabrator, $1542.82.
American Locomotive Co., New York, steel springs, $1573.
American Metal Co. Ltd., New York, solder, $29,730.
American Thermometer Co., St. Louis, boosters, $980,000.
American Type Founders Sales Corp., New York, screens, lamps, plates, $7120.11.
Anderson, Dorsey C., Philadelphia, electric welders, $1244.
Arguto Oilless Bearing Co., Philadelphia, punches and dies, $9222.
Armstrong, G. R., Co., Boston, hacksaw blades, $12,508.80.
Arrow Tool & Reamer Co., Detroit, cutting tools, end mills, $3537.40.
Art Steel Co. Inc., New York, accessory chests, $1030.40.
Atlas Ansonia Mfg. Co., New Haven, Conn., fuzes, $455,500.
Atlas Mfg. Co., New York, spare parts for machine guns, $1001.70.
Atwood Vacuum Machine Co., Rockford, Ill., parts for tanks, $14,075.50.
Auto Specialties Mfg. Co., St. Joseph, Mich., shot, $85,000.
Axelson Mfg. Co., Los Angeles, gages, $2067.50.
Barber-Colman Co., Rockford, Ill., hobbing machines, $18,012.60.
Barbour Stockwell Co., Cambridge, Mass., castings, $1524.52.
Barnes Drill Co., Rockford, Ill., honing machines, $17,325.
Barnes Mfg. Co., Mansfield, O., bronze castings, $17,987.19.
Bay State Abrasive Products Co., Westboro, Mass., grinding wheels, $1545.50.
Bendix Aviation Corp., Marine Division, Brooklyn, N. Y., repeaters and transmitters, $33,402.50; Bendix Products Division, South Bend, Ind., parts for carburetor, $2845.20.
Benrus Watch Co., Waterbury, Conn., screws, arbors, pinions, $210,687.50.
Bliss & Laughlin Inc., Harvey, Ill., steel, $4992.89.
Bohn Aluminum & Brass Corp., Detroit, brass rods, $8284.80.
Borg-Warner Corp., Rockford Drilling Machine Division, Rockford, Ill., clutch plate assemblies, $7650.
Brass & Copper Sales Co., St. Louis, brass, $5102.66.
Breeze Corps. Inc., Newark, N. J., block assemblies, parts for tanks, $7407.40.
Bridesburg Engineering Co., Philadelphia, tools, pins, keys, $1060.
Bridgeport Brass Co., Bridgeport, Conn., seamless tubing, $30,084.01.
Brown & Sharpe Mfg. Co., Providence, R. I., dial test indicators, steel parallels, $3834.85.
Budd, E. G., Mfg. Co., Philadelphia, bombs, $765,860.
Bulova Watch Co., Long Island, N. Y., hammer spring weights, $5822.
Byers Office Equipment Co., Davenport, Iowa, steel chairs, $1190.
C. & B. Machine Co., New Haven, Conn., gages, $3120.
Cape Ann Tool Co., Pigeon Cove, Mass., forgings, $3507.50.
Carnegie-Illinois Steel Corp., Chicago, steel, $12,564.24.
Champion Spark Plug Co., Toledo, O., spark plugs, $16,100.
Channon, H., Co., Chicago, warehouse trucks, $1540.56.
Chase Brass & Copper Co., Waterbury, Conn., brass, $13,676.14.
Christiansen, C. B., Newark, N. J., springs, plates, holders, punches, fixtures, jaws, $8175.
Chrysler Corp., Detroit, shells, $312,000.
Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, parts for milling machines, $1605.
Cincinnati Milling Machine Co., Cincinnati, milling machines and grinders, $6996.
Clancy, James A., Philadelphia, ebco panels, $1520.88.
Clark Equipment Co., Clark Tructractor Division, Battle Creek, Mich., ship mules and trucks, $8672.35.
Cleveland Twist Drill Co., Cleveland, drills and reamers, steel, $2497.61.
Climax Engineering Co., Clinton, Iowa, oil pump assemblies, $16,821.60.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., machine gun and automatic pistol parts, automatic pistols, $7648.25.
Consolidated Packaging Machinery Corp., Buffalo, N. Y., punches, dial assemblies, locating arms, fixtures, bushings and plate insert, $7422.75.
Continental Motors Corp., Muskegon, Mich., parts for light tanks, priming parts and ceramic plugs, engines, $33,383.78.
Crucible Steel Co. of America, New York, chromium nickel, $2346.74.
Cushman Motor Works, Lincoln, Nebr., metal parts, $219,000.
Dana Tool-D Nast Machinery Co., Philadelphia, taps, drills, saws and blades, tools, $4076.
Dempster Bros. Inc., Knoxville, Tenn., buckets for hoist unit, $4500.80.
Derbyshire Machine & Tool Co., Philadelphia, inner bearing rings, $1280.
Detroit Seamless Steel Tubes Co., Detroit, spare parts and assemblies for gun mounts, $1342.30.
Dictaphone Corp., Boston, remote control systems, $521,994.89.
DuPont, E. I., de Nemours & Co., Wilmington, Del., blasting caps, $19,375.
Eagle Electric Supply Co. Inc., Boston, cable, $2725.09.
Eagle Lock Co., Terryville, Conn., brass screws, $1146.53.
Eastman Kodak Co., Rochester, N. Y., height finders and sets, spare parts, $19,181.
Eaton Mfg. Co., Detroit, volute springs, $26,660.
Edgcomb Steel Co., Philadelphia, tool steel forgings, $2481.
Eisler Engineering Co., Newark, N. J.,

Navy Officers Address Monarch Employes

■ **Monarch Machine Tool Co. employes, numbering 1450, assembled in the plant at Sidney, O., recently to meet United States Navy officers from Washington and Cincinnati who inspected manufacture of lathes for defense. Occasion for the inspection was completion of the company's $625,000 plant addition. This, the Navy reports, represents the first Emergency Plant Facilities Contract sponsored by the Navy that has been entirely completed and in full operation. In all of 1940 Monarch built and shipped 1712 lathes. This year to Oct. 1 the company shipped more than 2400 lathes, with "our best three months of the year before us." Navy officers expressed appreciation to company officials and employes**

transformers, $1668.
Eis Mfg. Co. Inc., Middletown, Conn., casings, $7986.60.
Electric Auto-Lite Co., Toledo, O., generators and regulators, $16,436.
Electric Wheel Co., New York, trailers, $2369.64.
Ellis, R. E., Engineering Co., Chicago, reamers, $2015.
Essley, E. L., Machinery Co., Chicago, parts for honing machine, $1026.75.
Ever-Tite Mfg. Co., Davenport, Iowa, cast steel brackets, $1139.25.
Excel-Foundry & Machine Co., Fall River, Mass., fuzes, $2,494,000.
Ex-Cell-O Corp., Detroit, drilling machines, $7411.40.
Federal Products Corp., Providence, R. I., gages, $1590.
Finkl, A., & Sons Co., Chicago, steel die blocks, $4057.90.
Firth-Sterling Steel Co., McKeesport, Pa., cupping dies, $1908.
Flannery Bolt Co., Bridgeville, Pa., closing and nose plugs, $11,363.40.
Food Machinery Corp., Peerless Pump Division, Canton, O., deep well turbine pump, $4657.
Foote-Burt Machine Co., Cleveland, grinders, $3753.10.
Fox Munitions Corp., Philadelphia, gages, $3345.50.
Franklin Electric Co., Philadelphia, wire and outlet boxes, $1333.07.
Freeport Machine Works Inc., Freeport, Ill., parts for tanks, $1880.50.
General Cable Corp., Boston, hoodnuts and hoodnut terminals, $1166.40.
General Machine Co., Newark, N. J., blending equipment, $80,390.
General Metalware Co., Minneapolis, tube accessories, $321,408.
General Motors Corp., Detroit, guns, $27,009,376.50; Delco Appliance Division, Rochester, N. Y., spare parts for directors, $605,000.
General Motors Sales Corp., New Departure Division, Bristol, Conn., ball bearings, $1260.40.
Gilbert, A. C., Co., New Haven, Conn., aircraft flares, $448,125.
Gisholt Machine Co., Madison, Wis., balancing machines, $9750.
Grainger-Rush Co., Boston, electrical equipment, $3806.21.
Great Lakes Steel Corp., Ecorse, Detroit, steel, $1204.44.
Greene-Wolf Co. Inc., Brooklyn, N. Y., copper wire, $1547.50.
Greenfield Tap & Die Corp., Greenfield, Mass., gages, $1572.78.
Guiberson Diesel Engine Co., Chicago, parts for tanks, $10,867.25.
Hamilton Metal Products Co., Hamilton, O., steel chests, $10,539.58.
Hamilton Watch Co., Lancaster, Pa., fuzes, $5,720,000.
Hanson Whitney Machine Co., Hartford, Conn., hand metric taps, $1192.16.
Hanssens, Louis, Sons, Davenport, Iowa, bolts, handles, hooks, wire rope and wire cables, $24,368.93.
Hartford Electric Steel Co., Roxbury, Mass., attachment brackets, $1915.20.
Heald Machine Co., Worcester, Mass., boring and grinding machines, $993,-990.
Hercules Powder Co., Wilmington, Del., primer mixing machines, $69,000.
Hoover Co., North Canton, O., steel caps for fuzes, plunger heads, $28,170.20.
Illinois Tool Works, Chicago, cutters, $1050.
Imperial Electric Supply Co., Brooklyn, N. Y., cable, $1075.31.
Ingersoll-Rand Co., Boston, grinders, drills and rammers, $1160.20.
International Harvester Co. Inc., Chicago, parts for heavy tractors, $84,700.
International Industries Inc., Ann Arbor, Mich., optical elements, $264,500.
International Nickel Co., Huntington, W. Va., nickel copper alloy, $6274.69.
Ithaca Gun Co. Inc., Ithaca, N. Y., shotguns, $27,984.15.
Jamestown Steel Partitions Inc., Jamestown, N. Y., metal partitions, $5099.20.
Jeffrey Mfg. Co., Philadelphia, crushers, $2095.
Johnson-Claflin Corp., Marlboro, Mass., gages, $1072.
Jones & Laughlin Steel Corp., Pittsburgh, steel rod, $6070.73.
Kelsey-Hayes Wheel Co., Detroit, guns, $2,952,798.96.
Kingston Products Corp., Kokomo, Ind., shells, $76,348.80.
Krueger, H. R., & Co., Detroit, chambering machines, $40,360.
Lamson & Sessions Co., Cleveland, nuts, $3982.50.
Larkin Packer Co. Inc., Davis Boring Tool Division, St. Louis, boring bars, $4590.60.
LaSalle Steel Co., Chicago, steel, $9229.96.
Lawson, F. H., Co., Cincinnati, galvanized containers, $1179.50.
Leach Co., Oshkosh, Wis., assemblies, fuse bodies, $155,482.
Leidy Electric Co., Phillipsburg, N. J., linestarters and switches, duct and cables, $1187.21.
Leitelt Bros., Chicago, bronze castings, $1444.50.
Lincoln Mfg. Co., Chicago, screws and pins, $4633.89.
Lipe Gear Co., Buffalo, drop forgings, $2345.
Lloyd & Arms Inc., Philadelphia, lathes, $4376.
Logansport Machine Inc., Logansport, Ind., cylinders, cams, pilots, springs, $6184.10.
Machinery & Welder Corp., Moline, Ill., welding rods, $1633.
Manning, Maxwell & Moore, Shaw-Box Crane & Hoist Division, Muskegon, Mich., trolley drive wheel assemblies, $4981.
Martin-Parry Corp., York, Pa., assemblies, $1961.40.
Matthews, James H., & Co., Newark, N. J., dies, wedges, washers, blanks, bushings, and indicators, $1029.50.
May Co., Moline, Ill., wrought iron pipe, $1144.75.
McEvoy Co., Houston, Tex., tripod mounts, $120,175.11.
Michigan Seamless Tube Co., South Lyon, Mich., seamless steel tubing, $3676.90.
Midvale Co., Nicetown, Philadelphia, steel, $1510.07.
Midway Electric Supply Co., Brooklyn, N. Y., cables, $1838.10.
Mid-West Dynamometer & Engineering Co., Chicago, aircraft dynamometer, $4450.
Miller, Benedict, Inc., Newark, N. J., steel, $1019.12.
Miller Printing Machinery Co., Pittsburgh, parts for tanks, $14,832.03.
Minneapolis-Moline Power Implement Co., Minneapolis, miscellaneous latch parts, pins, ferrules, spacers, shafts, $5438.
Moore Special Tool Co. Inc., Bridgeport, Conn., dies, $7750.
Multi-Products Tool Co., Newark, N. J., anvils, pins, punches, springs, plungers and strippers, $7850.
Murphy, A. F., Die & Machine Co., Boston, plate stampings, $5609.85.
National Acme Co., Cleveland, screw machines, $25,407.60.
National Copper & Smelting Co., Cleveland, seamless brass tubing, $1797.08.
National Screw & Mfg. Co., Cleveland, wood screws, $10,575.
New England Pressed Steel Co., Natick, Mass., gas retainers, $12,605.
Niles-Bement-Pond Co., Pratt & Whitney Division, West Hartford, Conn., files and drilling, reaming and rifling machines, gun barrel drill shanks, gage blocks, reamers, arbors, blades, nuts and locking cams, $699,135.50.
Noble & Westbrook Mfg. Co., Philadelphia, marking and knurling machines, $1950.
Norma-Hoffman Bearings Corp., Stamford, Conn., ball bearings, $1566.74.
Northern Sales Co., Philadelphia, screws and files, $1694.70.
Norton Co., Worcester, Mass., grinders, $7588.50.
Offerman, L., Tool & Die Co., New York, gages, $1633.
Oliver Farm Equipment Co., Charles City,

Washington Officials Watch Army Engineers



■ **Government officials, including Vice President Wallace, and Latin American diplomats and attaches were interested spectators last week as new artillery and other units of ordnance and mechanized warfare were demonstrated at Ft. Belvoir, Virginia. The group is shown here watching army engineers lay a light steel frame bridge. Acme photo**

Iowa, gasoline tanks, $5479.
Otis Steel Co., Cleveland, steel, $2809.75.
Owatonna Tool Co., Owatonna, Minn., handles for wrenches, $1350.
Pallet Sales Corp., New York, double-faced pallets, $4320.
Parent Metal Products Inc., Philadelphia, steel cabinets, work benches, and shelving, $1712.50.
Parish Pressed Steel Co., Reading, Pa., gun carriages, $2,394,697.50.
Philadelphia Bronze & Brass Corp., Philadelphia, manganese bronze, $7684.96.
Poor & Co., Canton Forge & Axle Works Division, Canton, O., forgings, $6386.50.
Pratt & Letchworth Co. Inc., Buffalo, steel castings, $3256.28.
Pringle Electrical Mfg. Co., Philadelphia, power panels, $1266.10.
Producto Machine Co., Bridgeport, Conn., fly cutters, $3744.
Putnam Tool Co., Detroit, end mills and reamers, $10,095.
Reliable Tool Co., Irvington, N. J., tools, $9343.
Reliance Steel Casting Co., Pittsburgh, castings, $9152.
Republic Steel Corp., Cleveland, pig iron, steel, $6887.57.
Reynolds Metals Co., New York, strip aluminum, $1400.
Robertshaw Thermostat Co., Youngwood, Pa., boosters, $1,720,800.
Robinson Mfg. Co., Muncy, Pa., ammonium nitrate screening machines, $14,625.
Rockford Automatic Screw Co. Inc., Rockford, Ill., parts for tanks, $1081.99.
Roebling's, John A., Sons Co., Trenton, N. J., wire for mechanical time fuzes, $2438.
Roura Iron Works, Detroit, welded steel slag boxes, $1050.
Rustless Iron & Steel Corp., Baltimore, steel, $2653.20.
Saginaw Stamping & Tool Co., Saginaw, Mich., parts for rack on bomb trailer, $16,146.
Sawyer Engineering Co., Syracuse, N. Y., motors for attachment to machine tools, $6699.
Scaife Co., Oakmont, Pa., equalizing tanks, $2038.
Scovill Mfg. Co., Waterbury, Conn., latch clip pins, fuzes, brass rods, $828,904.58.
Sheffield Corp., Dayton, O., multichecks, $455,085.
Shipley, W. E., Machinery Co., Philadelphia, cold sawing machines, blades, and grinders, $22,588.
Simonds Saw & Steel Co., Fitchburg, Mass., homogeneous armor plates, saw blades, $3505.44.
Sipp-Eastwood Corp., Paterson, N. J., slider housing, thread cleaning machines, bushings, stops, plates, shanks, springs and screws, $17,777.
Slaymaker Lock Co., Lancaster, Pa., eccentric steel pins, $1662.42.
Smith & Mills Co., Cincinnati, machine tools and equipment, $39,930.
Sperry Gyroscope Co. Inc., Brooklyn, N. Y., desks, $2049.
Standard Machinery Corp., Providence, R. I., steel roller bearings, $1940.
Standard Transformer Co., Warren, O., transformers, $18,960.
Stark & Co., Philadelphia, running gears for trucks, $1493.55.
Star Machine & Tool Co., Cleveland, fixtures, $1156.
Sterling Switchboard Mfg. Corp., New York, battery switches, $2000.
Stewart-Warner Corp., Chicago, grease compressors, $3642.
Stokes, F. J., Machine Co., Philadelphia, upper and lower punch holders, $1910.
Stromberg Time Corp., Des Moines, Iowa, electric time recorders, $1928.
Suburban-Essex Machinists Inc., Orange, N. J., inspection gages, $2827.
Superior Sheet Steel Co., New York, terne plate, $1972.80.
Swanson Machine Co., Jamestown, N. Y., containers, $5084.
Taylor-Wharton Iron & Steel Co., Easton, Pa., shells, $826,000.
Timken Detroit Axle Co., Wisconsin Axle Division, Oshkosh, Wis., parts for tanks, $10,771.98.
Titeflex Metal Hose Co., Newark, N. J., ignition harness assemblies, $3630.
Torrance, M. J., Electrical Supplies Co., Rock Island, Ill., material to rewind generator, $2209.79.
Tri-Metal Products Corp., Conshohocken, Pa., castings, $12,192.63.
Tube-Turns Inc., Louisville, Ky., shells, $1,970,000.
Tungsten Electric Corp., Union City, N. J., carbide blanks, $22,500.
Union Twist Drill Co., Athol, Mass., cutting tools, end mills, reamers, arbors, drills, mills, $20,228.82.
Unique Specialties Co., New York, punches, screws, washers, jaws, holders, staking, $3186.50.
United Aircraft Products Inc., Dayton, O., assembly valves, $3150.
United Shoe Machinery Corp., Boston, design and construction of shell ramming and fuze setting device, $50,000.
Vanadium Corp. of America, New York, ferrochrome and ferrosilicon, $13,031.10.
Vinco Corp., Detroit, gages, $2700.
Vulcan Mold & Iron Co., Latrobe, Pa., cast iron chill molds, $31,824.
Waltham Gage Co., Detroit, inspection gages, $3765.
Warner Electric Brake Mfg. Co., Beloit, Wis., jumper cables, $6138.
Waterbury Clock Co., Waterbury, Conn., fuzes, $2,557,500.
Waterhouse Co., Webster, Mass., accessory cases, $24,855.28.
Watson-Stillman Co., Roselle, N. J., hydraulic straightening presses, $129,500.
Weatherhead Co., Cleveland, elbows for tubing, $1029.
Weidenhoff, Joseph, Inc., Chicago, storage battery chargers, $3080.
Western Cartridge Co., Winchester Repeating Arms Division, New Haven, Conn., pressure guns, $1305; East Alton, Ill., Division, skeet outfits, $14,700.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., induction motors, $41,344.
White Motor Co., Cleveland, fuses, gas-

Allegheny Ludlum Board Inspects New Facilities

■ **Directors of Allegheny Ludlum Steel Corp., Pittsburgh, following their regular meeting recently, inspected the company's two new production units, a 4-high rolling mill at West Leechburg, Pa., and an addition to the electric furnace department at Brackenridge, Pa., which will increase melting capacity of special steels by 50,000 tons a year.**

Left to right: M. C. Harris, district manager, Pittsburgh area plants; L. W. Hicks, E. J. Hanley, secretary and treasurer; A. E. Braun, W. F. Detwiler, chairman of the board; A. F. Dohn, H. G. Batcheller, president; W. C. Kirkpatrick and V. B. Browne, vice president in charge of research

kets, bolts, control assemblies, rear mirrors, radiator filler caps, $1568.25.
Wiedemann Machine Co., Philadelphia, gages, $1727.50.
Wiederhold & Hubbard Inc., New York, gages, $1104.
Williams, J. H., & Co., Buffalo, forgings, $18,900.
Wollaston Brass & Aluminum Foundry, North Quincy, Mass., castings, $3635.10.
Wood, Alan, Steel Co., Conshohocken, Pa., steel, aggregates, $8518.18.
Wyckoff Drawn Steel Co., Chicago, steel, $8397.82.
York Safe & Lock Co., York, Pa., shot, $1,064,000.
Zimmerman Steel Co., Bettendorf, Iowa, castings, $1274.99.

Air Corps Awards

Standard Aircraft Products Inc., Dayton, O., thermostat assemblies, $586,-380.
Weston Electrical Instrument Corp., Newark, N. J., instruments, $1,554,435.12.

Corps of Engineers Awards

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., hydraulic forcing presses, $3801.
Briggs-Weaver Machinery Co., Dallas, Tex., metal shapers, tool and cutter grinders, $14,537.
Chicago Pneumatic Tool Co., Los Angeles, air screwdrivers, riveters, rotary air drills, $100,025.
Hart Industrial Supply Co., Oklahoma City, Okla., bench lathes, $3864.70.
Invincible Vacuum Cleaner Mfg. Co., Dover, O., vacuum cleaners, $3982.50.
Kearney & Trecker Corp., Milwaukee, milling machines, $19,157.
Lincoln Electric Co., Tulsa, Okla., portable electric welders, $2806.
Machinery Sales & Supply Co., Dallas, Tex., universal grinders, hand screw machines, hydraulic surface grinders, $12,659.
Marshall Supply & Equipment Co., Tulsa, Okla., heavy duty gap lathes and accessories, $10,640.50.
McArdle Equipment Co., Houston, Tex., contour saw and filing machines, $4074.
Parker Appliance Co., Cleveland, hydraulic tube benders, $4799.97.
Southwest Industrial Equipment Co., Dallas, Tex., steel work benches, $17,-948.
Texas & Pacific Railway Co., Dallas, Tex., additional trackage to railway spur, $65,000.
Well Machinery & Supply Co., Ft. Worth, Tex., double end benches and grinders, $2325.
Wylie-Stewart Machinery Co., Oklahoma City, Okla., universal moto-cranes, $12,360.

Signal Corps Awards

Alden Products Co., Brockton, Mass., keys, $4012.80.
Connecticut Telephone & Electric Corp., Meriden, Conn., telephone equipment, handsets, $75,221.50.
Eital-McCullough Inc., San Bruno, Calif., valves, $1350.
Electrical Mfg. Co., Battle Creek, Mich., anchor rods, $78,000.
Farnsworth Television & Radio Corp., Ft. Wayne, Ind., radio receivers, $71,-946.
General Cable Corp., New York, cable and reels, $4768.
Graybar Electric Co., Chicago, sleeves, tools and insulators, $30,730.
Hubbard & Co., Cicero, Ill., insulator pins, $28,600.
Karp Metal Products Co. Inc., Brooklyn, N. Y., boxes, $8243.40.
Kohler Co., Kohler, Wis., prime movers, $5872.50.
Lafayette Radio Co., New York, headphones, $3000.
Leich Sales Corp., Chicago, wire, $31,172.
Locke Insulator Corp., Chicago, washers, $4325.
Onan, D. W., & Sons, Minneapolis, charging sets, $25,250.
RCA Mfg. Co. Inc., Harrison, N. J., heater assemblies, $1514.20.
Rome Cable Corp., Rome, N. Y., wire, $393,745.68.
Solar Mfg. Corp., Bayonne, N. J., condensers, $2290.
Wide World Photos Inc., New York, facsimile transceivers, and parts, $3380.60.

Quartermaster Corps Awards

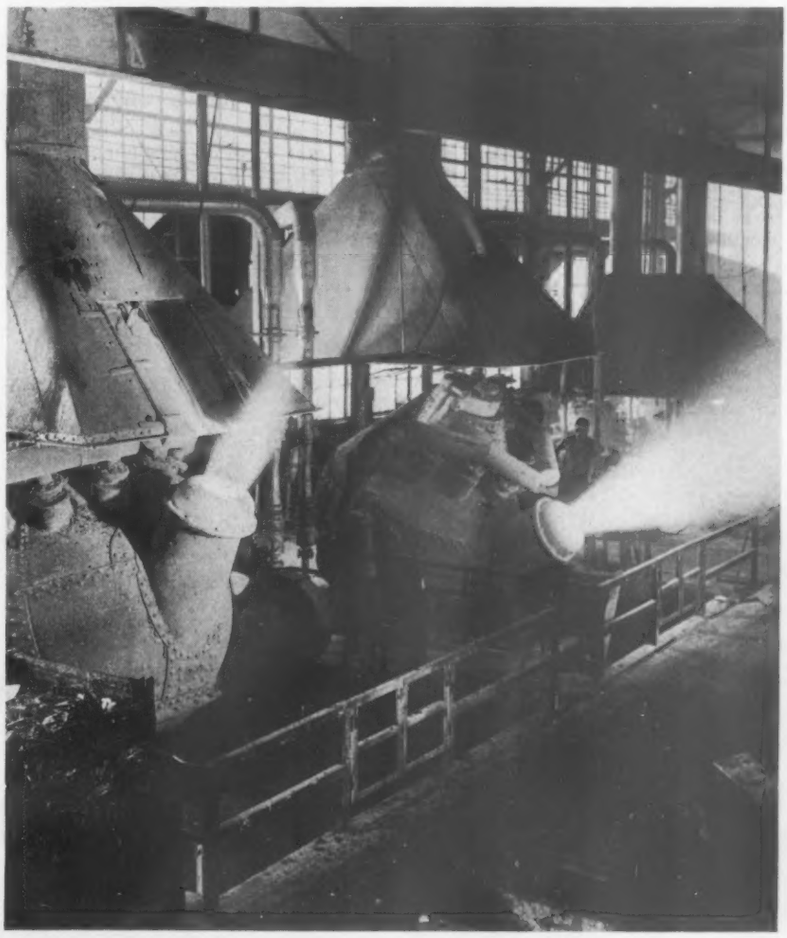
Brannock Device Co., Syracuse, N. Y., foot measuring outfits, $4850.
Diamond T Motor Car Co., Chicago, 4-ton trucks, $2,085,386.40.
Enterprise Tool & Metal Works, Chicago, component parts and accessories for field ranges, $102,438.11.
Ford Motor Co., Dearborn, Mich., truck-chassis, $521,001.
Four Wheel Drive Auto Co., Clintonville, Wis., tractors, $189,781.50.
General Motors Corp., Chevrolet Division, Tarrytown, N. Y., 1½-ton trucks, $16,148.68; Gray Marine Motor Division, Detroit, spare parts for boats, $3277.53.
International Harvester Export Co., Chicago, spare parts for tractors, $15,-185.17.
International Silver Co., Meriden, Conn., forks, $1580.
Mack Mfg. Corp., Plainfield, N. J., spare parts for trucks, spares and tools for wreckers, $108,739.93.
White Motor Co., Cleveland, solid axle beams, $37,812.50.
Yellow Truck & Coach Mfg. Co., General Motors Truck & Coach Division, Pontiac, Mich., 2½-ton trucks, $1,581,-444.20.

Loans Issued by DPC To Expedite Rearmament

■ Defense Plant Corp. reported last week the following loans, made to expedite defense production:

General Steel Castings Corp., Eddystone, Pa., $14,000,000; General Electric Co., Schenectady, N. Y., $25,-011,838; Wellman Bronze & Aluminum Co., Cleveland, $194,221; Singer Mfg. Co., New York, $2,500,-000; Scott & Williams Inc., Laconia, N. H., $609,331; De Laval Steam Turbine Co., East Trenton, N. J., $1,-250,000; Goodyear Aircraft Corp., Akron, O., $499,889; Koppers Co., Pittsburgh, $142,535; Continental Roll & Steel Foundry Co., East Chicago, Ind., $3,283,010; and Extruded Metals Defense Corp., $6,266,000.

"Tea Kettle" Furnaces in Action



■ **Metals reclaimed from Westinghouse Electric & Mfg. Co.'s machine shop shavings, punchings and other "leftovers" are melted in these gas air furnaces at the Linhart Works, east of Pittsburgh, to produce 20 tons of ingots daily. Before the "metal hash" is cooked at temperatures from 1800 to 2300 degrees Fahr., the mixture is analyzed and certain amounts of pure metals added to create various alloys. NEA photo**

Contract Distribution Division's Offices List Available Opportunities

■ DISTRICT offices of the Division of Contract Distribution, OPM, last week issued more defense subcontract opportunities available to companies qualified to handle the work and desiring to participate in the rearmament program.

Manufacturers wishing further details concerning any contract opportunity must seek that information directly from the office through which the item was issued. Drawings, exact specifications and frequently also actual samples of the product desired are available for inspection at the district offices.

Contract opportunities issued last week and not previously reported in STEEL included the following:

Division of Contract Distribution, OPM, 164 West Jackson boulevard, Chicago, is seeking contractors for the following work:

SDC-1003—A Chicago manufacturer wishes to let subcontracts for the manufacture of parts and assembly of various sizes of steel bodies and other appurtenances, requiring punch presses with both short and long strokes, automatic and hand screw machines, and small drill presses. Quantities varying from 100,000 to 1,000,000 complete units, with possible ultimate run of 5,000,000 units. Drawings at this office for examination.

SKF-924—A manufacturer is in urgent need of subcontractors having available time on multiple spindle Gridley Automatics, 2⅝ to 3½-inch capacity. Six spindle preferred as tools are available for these machines. Also Cleveland single spindle automatic, from 4 to 7-inch capacity.

DCDM-922—We have an immediate requirement for fuel transfer pumps. Description: Motor driven gear or van type-bronze fitted. Performance: Capacity 100 GPM against 20 pounds pressure with liquid of 1500 S.S.V. viscosity. Motor: Open type 208V, three phase 60 cycle low starting current type. Also fresh water transfer pumps to be exact duplicates of above except to be of bronze.

CMC-913 — Airplane motor manufacturing concern is looking for sources of supply of small tools of special character. These tools are of a great variety such as circular form tools used on screw machines, small broaches not of great length, special reamers and endmills, side and facemills, T-slot cutters, special cut-off and facing tools. The number required of each is not large but the total is considerable. It will prove to the advantage of a medium sized toolshop used to this work to look into this matter. Drawings may be inspected at this office.

GML-918—A Wisconsin machine tool manufacturer has work to sublet for turret lathes having a capacity for 4½" diameter bar stock, which requires spindle and chucking capacity of at least 4⅝" in order to handle large bars. The machine will not be used for chucking work.

SPG-1003—An eastern manufacturer wishes to sublet contracts for parts for intricate indicating devices requiring machine equipment capable of making parts to within .0003 to .001 limits. This requires automatic and hand screw machines, small lathes with collet attachments for cutting fine threads, small drill presses, small milling machines for cutting Woodruff Keyseats, small bevel and spur gear cutting equipment, with capacity small enough to cut bevel gears of 32 to 48 pitch and ⅛ to 2½ outside diameter. Equipment must be capable of working to the tolerances above specified. Quantities will be run in lots of 1000 or more. The prime contractor will furnish materials. In some cases gear blanks only may be required.

Division of Contract Distribution, OPM, Federal Reserve Bank Building, Cleveland, asks for contractors for the following work:

38—1002—Cleveland manufacturer has work to subcontract for 3" automatic screw machines, rough machining, bushing blanks from 3⅛" diameter bar stock to be furnished. Material: Nitralloy—Grade G. Blanks to be 4.015" long, 2.388" O.D., 1.865" I.D. Collar one end 2.875" diameter x .270". Commercial limits. Will let all or any part of 160,000 pieces. Prints, sample on hand this office.

39—1002—Cleveland manufacturer will need machining facilities for rough machining only of shell forgings, approximate size 1½" x 5½". Quantity production up to 10,000 pieces per day.

40—1002—Northeastern Ohio manufacturer requires finishing, machining, turning, drilling and tapping of 5000 sets of brass motor end castings—approximate diameter 3½" and other small parts. Prints and samples may be seen in this office.

41—1002—A Massachusetts manufacturer will need large quantities of body and striker parts for shell nose fuze assemblies. The material is WD, X-1314 cold drawn steel and operations involved require 2¼" and 2½" automatic screw machines plus threading, drilling, and tapping. Commercial tolerances only required. Delivery begins February 1942. Blueprints on file in this office. A-1-c priority rating.

42—1003—Cleveland manufacturer has work for No. 2 to No. 4 turret lathes or automatic chucking machines. Needs 500 to 2000 finished pieces per week for each of 500 items. Aluminum forgings furnished. Typical prints and samples may be seen in this office.

43—1002—Texas shipbuilder desires to find source of forgings for propeller line shafting consisting of hollow shafts of seven sizes, ranging from 5 to 49 feet in length and from 16 to 23¾ inches in diameter. A number of sets of each are required, also facilities for boring same. Bidder may quote on forgings or machine work only.

19—807—A Texas ship-building company desires to subcontract machining, grinding, polishing, and, if possible, dynamic balancing of a number of manganese bronze three-blade propellers. Approximate dimensions: 11.5' diameter, 4.5' hub thickness. Approximate weight 15,000 lbs. each. This work continuous for deliveries up to 1943. Blueprints on file in this office.

25—823—Indiana manufacturer requires subcontractors for gun director parts. 50 sets of parts (20 castings per set). Equipment to consist of horizontal boring mill, jig borers, milling machines, and radial drill presses. Materials are steel, bronze, and aluminum. Tolerances are plus or minus .010 and .0002. Representative blueprints on file in this office.

26—823—Indiana manufacturer wants to subcontract housing and end frames for high power propeller motors. Will require No. 4 P. & J. automatic chucking turret lathes and drills. Operations are boring, facing, drilling, and tapping. Materials consist of magnesium, cast steel, and aluminum; permanent mold, sand and die casting, all furnished, together with jigs and fixtures. Very smooth finish is important. Representative blueprints, together with samples, on hand at this office.

Bidding forms on any of these schedules should be obtained by wiring, mentioning schedule number, to the Bureau of Supplies and Accounts, Navy Department, Washington:

8791—Clamps, jackstay, QR-large; bids Oct. 21.

8801—Chains and fittings, misc. QR-large; bids Oct. 21.

8870—Cartridges, white, QR-500,000, red, 250,000 and green, 250,000; bids Oct. 21.

8890—Plugs, steel, dummy nose, 1.1 inch/75 caliber, QR-500,000; bids Oct. 21.

8891—Buoys, peg top, QR-50; bids Oct. 21.

8897—Weights, stretcher, gray iron casting, wrought iron bail, QR-8—4-ton and 140—8-ton; bids Oct. 21.

8916—Barrels, steel, with rods, eyes and links, 175 and 300-gallon capacity, QR-2525, bids Oct. 21.

8926—Storage battery testing outfits, and parts, misc. QR-large; bids Oct. 16.

8927—Compressors, air, motor driven, with spare parts, special tools and wrenches, QR-20 compressors; bids Oct. 16.

8930—Mercury, metallic, in 5-pound earthenware or glass bottles, QR-12,560 pounds; bids Oct. 23.

8931—Boilers, complete with burners, soot blowers, valves, fittings, etc., QR-4; bids Oct. 17.

8934—Buoys, mooring, cylindrical, QR-331; bids Oct. 21.

8937—Shackles and thimbles (forgings) QR-large; bids Oct. 21.

8952—Anchor chain and links, detachable, misc. QR-large; bids Oct. 24.

8956—Anchors, steel, stockless, QR-30; bids Oct. 17.

Bidding forms on any of these schedules should be obtained by wiring, mentioning schedule number, to the War Department, Air Corps, Materiel Division, Office of Contracting Officer, Wright Field, Dayton, O.:

42-752—Lock nuts, QR-69,582,500; bids Oct. 16.

42-763—Motor and starting equipment, QR-2; bids Oct. 17.

42-782—Cable, high tension ignition, steel conductor, 0.200 diam. on non-returnable reels, QR-360,000 feet; bids Oct. 17.

Heavy Gun at Mountain Test Range

■ **General view of a 155-millimeter cannon is shown at the testing range of the new Radford ordnance plant in Virginia. The cannon is fired into a tunnel in the mountain, and a record testing velocity of the shot fired is made on a Boulenge chronograph. NEA photo**

Canada Restricts Consumers' Goods Production to 75% of 1940 Volume

TORONTO, ONT.

■ FURTHER restrictions on manufacture of nonessential civilian commodities in Canada were put into effect Oct. 1 through an order providing reduction of future domestic production of radios, refrigerators, stoves, vacuum cleaners and electric washing machines to 75 per cent of 1940 output.

Actual decrease in production is expected to be greater than the order requires, as manufacturers are reported finding it virtually impossible to obtain necessary raw materials. Scarcity in steel sheets, small angles and similar items is said to be especially acute.

Preliminary reduction to 75 per cent of 1940 output will result in the following estimated decreases in production of consumers goods included in the order: Radios, 123,000; electric washing machines, 25,000; electric refrigerators, 13,000; electric stoves, 7700; gas stoves, 7700; and vacuum cleaners, 10,000.

Contracts placed by the Department of Munitions and Supply in the week ended Sept. 23 totaled 3114, with aggregate value $13,322,895. United States companies received orders totaling $1,062,059.

DeHavilland Aircraft of Canada Ltd., Toronto, received a $2,040,000 award for 450 "Mosquito" planes, the first Canadian fighter craft to be equipped with engine before export. Rolls Royce engine, manufactured by Packard Motor Car Co., Detroit, will power the plane. Only engines and instruments will be imported from United States. Other awards:

Aircraft: Canadian Pratt & Whitney Aircraft Co. Ltd., Longueuil, Que., $49,928; Fairchild Aircraft Ltd., Longueuil, $5464; Aluminum Co. Ltd., Montreal, $104,383; Aviation Electric Ltd., Montreal, $80,262; Noorduyn Aviation Ltd., Montreal, $197,084; Anaconda American Brass Ltd., New Toronto, Ont., $69,464; DeHavilland Aircraft of Canada Ltd., Toronto, $2,040,000; Federal Sales Engineering Ltd., Toronto, $12,434; National Steel Car Corp. Ltd., Malton, $183,613; MacDonald Bros. Aircraft Ltd., St. James, Man., $11,077.

Instruments: Fairchild Aircraft Ltd., Longueuil, Que., $5430; Harrison Co. Ltd., Montreal, $17,522.

Electrical Equipment: Canadian Marconi Co., Montreal, $10,650; Smith & Stone Ltd., Georgetown, Ont., $7776.

Machinery: Duke Equipment Co. Ltd., Montreal, Que., $10,157; International Harvester Co. of Canada Ltd., Ottawa, Ont., $65,614; W. L. Ballentine, Toronto, $12,896; A. R. Williams Machinery Co. Ltd., Toronto, $9994; Sawyer-Massey Ltd., Hamilton, $10,225; Herbert Morris Crane & Hoist Co. Ltd., Niagara Falls, Ont., $5049.

Fire Fighting Equipment: Dominion Merchants Co. Ltd., Montreal, Que., $5236; Walter Kidde & Co. Ltd., Montreal, $12,584; C.-O.-Two Fire Equipment Co. of Canada Ltd., Toronto, Ont., $107,335; LaFrance Fire Engine & Foamite Ltd., Toronto, $95,760; Pyrene Mfg. Co. Ltd., Toronto, $49,035.

Ordnance: Eastern Car Co. Ltd., Montreal, Que., $90,720; Canadian Ice Machine Co. Ltd., Toronto, Ont., $5143.

Munitions: Overseas Requisition, London, England, $18,394; International Flare Signal Co. Ltd., Waterloo, Que., $50,760; Sorel Industries Ltd., Sorel, $8640; Dominion Arsenals, Ottawa, Ont., $5000; Alcor Co. Ltd., Toronto, $19,278; National Steel Car Corp. Ltd., Hamilton, $49,545; Cockshutt Plow Co. Ltd., Brantford, $86,659; Robert Bell Engine & Thresher Co. Ltd., Seaforth, $100,302.

Metals: Drummond McCall & Co. Ltd., Montreal, Que., $36,145.

Chemicals: Defense Industries Ltd., Montreal, Que., $457,600.

Miscellaneous: Canadian Fairbanks-Morse Co. Ltd., Ottawa, Ont., $7040; Canada Electric Co. Ltd., Toronto, $24,437; Central Bridge Co. Ltd., Trenton, $13,000; Poole Construction Co. (Sask.) Ltd., Regina, Sask., $20,000; J. V. Macpherson Ltd., Halifax, N. S., $90,000; R. B. MacLeod & Co., Saskatoon, Sask., $36,000; Partridge-Halliday Ltd., Winnipeg, Man., $232,000; Dominion Chain Co., Niagara Falls, Ont., $9000; Harry Scholey, Penetang, Ont., $7000; Walker & Holberton Ltd., Lethbridge, Alta., $30,000; H. D. Wheeler Ltd., Saskatoon, Sask., $29,000; Dominion Construction Co., Fredericton, N. B., $34,000; Northern Construction Co., and J. W. Stewart, Vancouver, B. C., $60,000; Sterling Construction Co., Windsor, Ont., $8000; Nelson River Construction Co., Winnipeg, Man., $17,000; T. W. Curry, Sydney, N. S., $16,000; Power Bros Ltd., Lunenburg, N. S., $6000; Otter Bros. Ltd., Winnipeg, Man., $13,000.

War Construction Projects: Tomlinson Construction Co. Ltd., Toronto, Ont., $1,100,000.

Shipbuilding: A. C. Benson Shipyards Ltd., Vancouver, B. C., $11,746; Maquinna Investments Ltd., Vancouver, $9720.

Dockyard Supplies: Heaps Engineering Co. (1940) Ltd., New Westminster, B. C., $28,728.

Land Transport: General Motors Products of Canada Ltd., Oshawa, Ont., $5440; Ross Cycle & Sports Ltd., Toronto, $6134.

Tank Tracks, Made in Chicago, Arrive in England

■ **Tank tracks, urgently needed in England, are unloaded at an unnamed British port. The tracks were manufactured in Chicago, escorted part of the way across the Atlantic by United States warships, according to British censor-approved caption. NEA photo**

French Steel Output, Half of Needs, Allocated Through "Materials Bills"

By STEEL'S FRENCH CORRESPONDENT

SOMEWHERE IN FRANCE

■ SHORTAGE of steel—50 per cent of requirements—and of coal are among the gravest problems facing France. Steel mills are operating at a low percentage of capacity. Coal production is suffering because miners are insufficiently fed, and part of the output is shipped to Italy or to steel mills in the Moselle which normally obtain fuel from Belgium or the Ruhr.

French steel production must be considered among the various zones established after the German invasion. These are: The free zone; the occupied zone; and the forbidden zone. The forbidden zone includes the region of the North covered directly from the German staff at Brussels and the region of the East, including the valley of the Meurthe and Moselle, which is under the direction of Hermann Roechling, and Longwy under the direction of a German administrator.

During the period September, 1940, to January, 1941, the unoccupied zone and the occupied zone had need for 230,000 metric tons of steel per month. Actually, production was 40,000 to 50,000 tons, total for the two zones. In addition, 25,000 tons of steel was delivered to the factories of the North and the East by authorization of the Germans. This dis-proportion between the production and the needs required a delicately balanced distribution of all ferrous products.

Necessitated Many Formalities

In the first place, the Office of Distribution of Iron, Castings and Steel accepted orders for delivery only under the control of the Organizing Committee, to which each user adhered, and accepting an order was dependent upon a minute examination of the statistics of production and consumption.

This method, which functioned until 1941, was bad in itself because it necessitated formalities and requests in writing which were long and complicated, and often completely overlooked the fact that actual statistics were rare and seldom precise. Nevertheless, the system was operated, and between November, 1940, and April, 1941, producers' order books were maintained within reasonable limits. From May, 1941, a new system became operative that depends upon a *bons-matieres* or material money. The principles are as follows:

The Office of Distribution determines from the statistics of production the quantity of steel that will become available in the month to come, and fixes as a counterpart the credit of all of the metal that can be distributed among users. This credit is estimated in tons and forms the basis for the admission of bills (*bons-matieres*), which equal in total tonnage the credit available. These bills exist in denominations of 50, 10, 5 tons, to as small as 1 kilogram. The bills are numbered and carry specific references, the limiting date of their validity, and also indicate what public service or committee of organization is to be the beneficiary of the steel.

The Public Service remits to their contractors, the Committee of Organization remits to their members, the bills equal in value to the tonnage for which they will have need of in executing their work, and it is with these bills that the necessary metallurgical products are purchased. This material money is, therefore, a right to buy, and every plant or user of metallurgical products or finished steel products must affix to their order a quantity of bills, the total of which must cover exactly the weight and the quantity of the siderurgical products required for the manufacture of the finished steel desired. Consequently any company engaged in transforming steel products, in order to obtain material, passes his order to the *Comptoir des Produits Siderurgiques* with their *bons-matieres.*

New System Satisfies

The comptoir will execute the order by one of the mills of their own choice. It appears that this system, which has functioned for several months, gives satisfaction and solves in a large measure the problem of distribution of ferrous products in France.

The Office for the Distribution of Iron, Castings and Steel, with the Committee for Steel Organizations, have worked diligently with the German authorities to obtain as much steel as possible from the producing zones in the North and East of France. The tonnage allowed to be shipped from these regions has been increased to about 60,000 tons per month so that in France we have available close to one-half the tonnage of steel necessary for our needs.

Approximately 50,000 tons also are delivered monthly from the Ger-

British Destroyer Repaired in U. S. Navy Yard

■ British destroyer, H. M. S. FIREDRAKE, in drydock at the Boston Navy yard undergoing repairs. The British aircraft carrier ILLUSTRIOUS, four cruisers and a number of battleships, corvettes, destroyers, submarines and minesweepers also are being repaired in this country's naval yards. NEA photo

man mills in the Ruhr. This is in compensation for the reduction of our production caused by the requisitioning by the army of occupation or caused by an insufficient quantity of fuel.

The metallurgical production is variable, depending upon the region; in the North it is 50 to 60 per cent of the production of an average year —1937 for example. In the region of Longwy, where there are three blast furnaces, it is 20 per cent, and in the valleys of the Meurthe and Moselle 60 per cent of normal.

Another problem which is very grave now and for the future, is that of coal. Production is much smaller than in ordinary times, partly due to the fact that the miners are insufficiently fed. Of the tonnage extracted from the mines of the North, 10 per cent goes to Italy, and a part is shipped to the steel mills of the Moselle, whereas in normal times these mills receive their coal from Belgium or from the Ruhr.

Shortage of Iron, Steel Products Causes Much Concern in Argentina

BUENOS AIRES, ARGENTINA

■ LACK of iron and steel in this country is causing serious concern, according to the Argentine Financial Service, Buenos Aires. In the first seven months this year tonnage imports, not including machinery and automobiles, decreased as follows:

	1941	1940
January	22,259	63,013
February	12,925	68,046
March	17,997	58,717
April	30,336	80,038
May	32,711	46,102
June	30,737	44,238
July	31,262	44,474

This reduction is only partly due to American export restrictions, but mainly to Argentine import regulations which gradually are being removed. For some years past, Argentine authorities have kept imports down and in this way prevented accumulation of stocks. Under the twofold influence of Nazi propaganda (war will be over by September, 1940,) and British "business as usual" affirmations, Argentina refused to sign a commercial treaty with the United States in December, 1939, and continued to refuse import permits for iron and steel products to the extent wanted by importers and the Argentine manufacturing industry.

At present, shortage of certain products of iron and steel is keenly felt. Time and again, representatives have approached the government, pleading for intervention at Washington to get certain minimum quantities released from the United States. At the same time, the trade treaty long under consideration has not yet been signed, and Argentine government reaction to the sensational revelations of Nazi activities, made by the so-called "Argentine Dies Committee" has not been very clear. That is why co-operation between the United States and Argentina, in the field of business, has not yet achieved the desirable maximum.

Meanwhile, Argentina is trying to make use of her scrap iron stocks to build up a metallurgical industry. There are several large plants for manufacturing iron sheets and wire, including barbed wire; but they depend on steel imports. As the country has no coal, it can hardly expect to establish a heavy industry of its own. A plan to ship high-grade Brazilian iron ore here, mix it with low-grade Argentine ore and use British coal for smelting is being discussed. This, of course, would be a postwar project.

Due to lack of steel the situation in the Argentine building industry is almost desperate. Although the former minister of finance, Pinedo, who recently visited the United States had suggested a large-scale program of popular-priced suburban housing, there are hardly any official funds available for that purpose, while the plan is opposed by the owners of city slum buildings. Such a housing program could have been executed with a restricted volume of iron and steel, but private housing projects are based on 10 to 14-floor apartment houses which require just that steel which is not available or only available at prohibitive prices.

British Workers Cheer Russian Ambassador

■ **British workers, standing under the Union Jack and the Soviets' hammer and sickle, cheer M. Maisky, Russian ambassador to London as he visits a tank factory to accept the first armored unit supplied by Britain under the aid-to-Russia program. NEA photo, passed by British censor**

J. A. Farrell Urges Neutrality Act Repeal

■ James A. Farrell, chairman, National Foreign Trade Council, told the more than 1000 exporters and importers attending the twenty-eighth annual foreign trade convention in New York last week that the maintenance of the United States exports at the highest level consistent with Army and Navy requirements is fundamental to national economic defense now and after the war.

He called for repeal of the neutrality act, long opposed by traders, saying that the "day for appeasement by surrender of our rights has long been past."

The solution after the war, he said, rests on the willingness of nations to substitute collaboration for unilateral action. The American economic defense measures must aim at freer international trade and the abolition of discriminary rationing of imports by quotas and exchange allocations.

$4,000,000,000 Social Security Fund Surplus Created by High Tax Rate

■ SOCIAL security fund surplus, accumulated since enactment of the statutes in 1936, is reported to be more than $4,000,000,000 greater than would be needed to fulfill all obligations to beneficiaries under the act. Income of both the unemployment compensation and old age retirement funds has consistently and substantially exceeded payments to individuals covered by the law.

Automatic tax rate increase provided by the present law will accelerate accumulation of this fund far beyond the present limits. Meanwhile, the surplus is taken over by the federal government and spent on current general expenditures, with government bonds substituted for the cash fund. However, money required to redeem these bonds in the Social Security fund will have to be paid, at some later date, in the form of taxes by this or future generations.

A study recently completed by Representative Emanuel Celler, (D.) New York, incident to his introduction in congress of a bill to reduce by one-third the payroll tax on employers, shows that under a basic payroll tax of 3 per cent the existing levy has raised $3,621,358,523 for deposit in an unemployment compensation trust fund administered by the Treasury. Interest earnings have increased this total to about $4,000,000,000.

In the same period, five and a half years, unemployment compensation payments to covered workers totaled $1,549,975,841. Adding other charges and withdrawals from the fund, there remained a balance, as of June 30, 1941, of $2,283,657,696. This fund is separate and distinct from the old-age insurance accumulation.

Growth of the unemployment compensation fund "at an unwarranted rate" is further shown by a compilation prepared by American Taxpayers' Association, Washington. Based on official treasury statements, the tabulation shows:

In fiscal 1938, payroll tax yielded $747,660,497; workers received $190,975,000 in benefit payments.

In fiscal 1939, tax was $811,250,508 and payments $441,795,000.

In fiscal 1940, total tax was $859,863,884; benefit payments, $482,963,000.

In fiscal 1941, tax was $892,023,224 and payments $433,242,841.

Accompanying tabulation, prepared by American Federation of Investors Inc., Chicago, includes a list of 152 representative corporations and shows taxes paid by each in 1940 under the Federal Social Security Act. Taxes as shown include payments made by employers into the federal fund for old-age insurance and survivor benefits and also for federal and state unemployment compensation. Portion of the old age benefit tax paid by employes is excluded.

Total social security tax payments of the 152 companies in 1940 was $204,983,786. This was more than 10 per cent of these companies' combined tax accruals and payments in the year. It was equal to 36 cents per share on all outstanding common and preferred stocks, represented $40 per stockholder and $68 per employe.

Wide divergence in percentages

Seven Months' Iron, Steel Imports Only 12,339 Tons

■ Imports of iron and steel products in July, excluding scrap, totaled 1631 gross tons, 56 per cent less than 3717 tons in June, according to the Department of Commerce. Imports in July, 1940, were 3390 tons. Cumulative imports for seven months this year were 12,339 tons, only 30 percent of 42,178 tons received in the corresponding portion of 1940.

Rails and track materials constituted the largest item in July, 884 tons, all from Canada. Ferrosilicon was second with 369 tons, also all from Canada, followed by flat wire and steel strip, 163 tons, all from Sweden. Canada was the chief source of supply with shipments of 1391 tons, followed by Sweden with 164 tons and the United Kingdom with 74 tons.

Scrap imports in July increased to 9418 tons from 6473 tons in June. In July, 1940, scrap imports were 152 tons. Cuba contributed 9126 tons in July, with Surinam, Russia and Canada providing the remainder.

■ Farm implements and machinery exported in July totaled $6,552,967, slightly lower than $6,563,090, the value in July, 1940, the Department of Commerce reports. Tractors, parts and accessories exports were valued at $4,497,080 in July, 19 per cent larger than the value in July, 1940, $3,763,260.

U. S. IMPORTS FOR CONSUMPTION OF IRON AND STEEL PRODUCTS

Gross Tons

Articles	July 1941	July 1940	Jan. thru July 1941
Pig iron	.....	1,067	.....
Sponge iron	.....	.....	23
Ferromanganese*	.....	319	11
Spiegeleisen	.....	662	2,926
Ferrochrome†	.....	.....	69
Ferrosilicon‡	369	103	2,205
Other ferroalloys§	.....	25	.....
Steel ingots, blooms, etc.	.....	.....	1
Billets, solid or hollow	.....	.....	56
Concrete reinforc. bars	.....	.....	2
Hollow bar, drill steel	.....	27	153
Bars, solid or hollow	40	26	202
Iron slabs	.....	.....	.....
Iron bars	.....	.....	15
Wire rods	.....	18	105
Boiler and other plate (including skelp)	1	2	9
Sheets, skelp, saw plate	.....	13	44
Die blocks or blanks, etc.	2	.....	8
Tin plate, taggers' tin and terneplate	9	15	69
Structural shapes	3	4	52
Sashes and frames	31	.....	181
Sheet piling	.....	.....	.....
Rails and track material	884	531	3,507
Cast-iron pipe, fittings	.....	.....	.....
Malleable iron pipe fittings	.....	.....	.....
Welded pipe	.....	31	.....
Other pipe	96	151	668
Cotton ties	.....	11	.....
Other hoops and bands	.....	.....	.....
Barbed wire	.....	42	.....
Round iron, steel wire	.....	20	28
Teleg., telephone wire	.....	.....	.....
Flat wire, steel strips	163	256	1,679
Wire rope and strand	4	41	92
Other wire	.....	.....	1
Nails, tacks, staples	1	1	22
Bolts, nuts, and rivets	4	3	26
Horse and mule shoes	.....	.....	.....
Castings and forgings	24	22	185
Total	1,631	3,390	12,339
Iron and steel scrap	9,418	152	26,311
GRAND TOTAL	11,049	3,542	38,650

*Manganese content. †Chrome content. ‡Silicon content. §Alloy content.

ORIGIN OF JULY IMPORTS

Gross Tons

	Iron ore	Manganese ore
United Kingdom	28	.....
Canada	23,529	.....
Mexico	349	42
Cuba	15,300	.....
Chile	142,600	7,483
Newfoundland	7,020	.....
Brazil	7,500	11,342
Phillipine Is.	.....	1,082
Netherlands Indies	.....	571
British India	.....	2,614
Soviet Russia	.....	35
South Africa	.....	590
Gold Coast	.....	7,685
Total	196,326	31,444

	Structural steel	Steel bars
Canada	2	39
Sweden	...	1
Total	2	40

U. S. FOREIGN TRADE IN IRON AND STEEL, INCLUDING SCRAP

Gross Tons

	1941		1940	
	Exports	Imports	Exports	Imports
Jan.	698,853	423	583,521	8,274
Feb.	600,240	796	671,301	6,740
Mar.	567,227	6,273	663,980	5,096
April	635,809	4,286	612,906	6,674
May	472,734	5,633	783,964	7,759
June	457,685	10,190	936,047	5,505
July	537,921	11,049	1,034,938	3,542
Aug.	.....	.....	1,402,075	2,105
Sept.	.....	.....	1,221,052	2,598
Oct.	.....	.....	1,105,510	3,966
Nov.	.....	.....	788,176	980
Dec.	.....	.....	805,158	4,064
Tot.	.....	.....	10,608,628	57,303

shown in the tabulation of the various corporations is reported caused by conditions and circumstances that are not common to all the companies listed. Rate shown for the railroads, for example, is high in proportion because the tax figures include amounts paid under the Railroad Retirement Act.

Under the present act there are more than 40,000,000 eligible for old-age benefits and 32,000,000 for unemployment compensation. Proposal has been made the act be extended to include about 15,000,000 more in the old-age insurance and 3,000,000 more under unemployment compensation.

Social Security Taxes Paid by 152 Corporations for 1940

(FOR FISCAL YEAR 1940) Name of Company	1940 Social Security Taxes*	Per Cent of Company's Total Taxes	Average Cost per Share (Com.-Pfd.)	Average Cost per Employe
Acme Steel Company	$ 188,706	10.8%	$0.58	$ 68
Air Reduction Company, Inc.	343,866	9.5	.13	78
Allegheny Ludlum Steel Corp.	600,229	15.8	.47	63
Allis-Chalmers Mfg. Co.	1,067,730	20.7	.60	71
American Can Company	1,315,860	11.0	.46	58
American Cyanamid Company	617,852	13.0	.18	52
American Radiator & S. S. Corp.	1,112,000	21.8	.11	56▲
American Rolling Mill Co.	1,157,088	24.4	.35	68
American Smelt. & Ref. Co.	790,000	8.0	.29	27
American Steel Foundries	359,229	19.4	.30	63
American Tel. & Tel. Co.	18,606,449	9.9	.93	68
American Tobacco Company	702,980	0.5†	.14	36
Amer. Water Wks. & Elec. Co.	479,643	4.7	.19	44■
Amer. Zinc, Lead & Smelt. Co.	107,992	25.7	.15	58
Armour and Company	3,151,831●	35.7●	.61	58▲
Armstrong Cork Company	602,675	24.8	.41	65▲
Atlantic Refining Company	860,627	2.3†	.31	69
Atlas Powder Company	186,240	12.5	.58	60○
Baldwin Locomotive Works	723,506	13.6	.65	71
Baltimore & Ohio R. R. Co.	4,987,307#	42.3	1.58	122
Beatrice Creamery Company	344,806	22.5	.73	58
Bendix Aviation Corporation♦	737,646	13.6	.35	57
Bethlehem Steel Corporation	8,156,978#	19.7	2.08	69
Borden Company	1,675,757	25.9	.38	62
Borg-Warner Corporation	738,374	13.1	.32	68
Bristol-Myers Company	79,686	6.0●	.12	98▲
Brunswick-Balke-Collender Co.	195,572	14.0	.42	59■
Bucyrus-Erie Company	164,788	8.4	.13	57
Burroughs Adding Machine Co.⊗	750,646	32.4	.15	82○[1]
Butler Brothers	351,186	29.8	.25	44
Case (J. I.) Company	354,516	30.0	1.19	68
Caterpillar Tractor Co.	851,652	16.8	.45	72
Celanese Corp. of America	630,290	11.6	.44	53
Chicago & North Western Ry.	2,896,319#	43.9	1.60	113
Chrysler Corporation[2]	5,725,454	10.8‡	1.32	83
City Ice & Fuel Company	313,158	15.6	.24	63
Colgate-Palmolive-Peet Co.[3]	457,520	14.4‡	.22	46■
Columbia Gas & Elec. Corp.	806,175	4.4	.06	53
Commonwealth Edison Company	1,116,766	3.6	.09	66
Consol. Edison Co. of N. Y.	2,893,963	4.9	.21	80
Continental Can Company	864,193	16.5	.28	56
Continental Motors Corp.	142,666	34.9	.05	84
Corn Products Refining Co.	347,678	10.4	.13	72
Crane Co.	1,028,217	27.4	.40	65
Crown Cork & Seal Co., Inc.	319,546	29.0	.43	61
Crown Zellerbach Corp.	512,730	13.6[3]	.18	59
Curtis Publishing Company	413,244	25.1	.10	102
Cutler-Hammer, Inc.	261,767	16.5	.40	76
Detroit Edison Company	669,077	6.3[4]	.53	97[4]
Devoe & Raynolds Company	112,595	40.0	.66	68
Diamond Match Company	262,840	17.9	.20	53
Douglas Aircraft Company	1,063,393	25.2	1.77	64
Du Pont de Nemours & Co.	4,199,000	7.4	.33	73
Eastman Kodak Company	1,830,649	13.7●	.72	66▲
Electric Storage Battery Co.	310,315	15.1	.34	59■
First National Stores, Inc.	640,601	26.8	.78	46
Food Machinery Corporation	106,600[5]	15.8	.24	63
General Foods Corporation	631,627	8.9	.12	56
General Mills, Inc.	579,030	22.4	.65	77
General Theatres Equip. Corp.	77,014	18.6	.13	64
General Tire & Rubber Co.	212,362	15.6	.39	57
Grant (W. T.) Company	525,000	13.7	.34	26
Houdaille-Hershey Corp.	319,348	18.8	.33	63
Illinois Central R. R. Co.	3,179,603#	31.6	2.06	106
Inland Steel Company	1,352,687	14.7	.83	68
Interlake Iron Corporation	119,981	17.0	.06	63
International Shoe Company	1,192,417	34.3	.36	40
Jewel Tea Co., Inc.	207,507	14.4‡	.37	54
Johns-Manville Corporation	656,431	14.1	.72	55■
Kelsey-Hayes Wheel Company	290,218	25.0	.53	91
Kennecott Copper Corp.	1,274,166	5.1	.12	47○
Kimberly-Clark Corporation	221,229	13.6	.38	44
Kresge (S. S.) Company	936,183	10.9	.17	30
Kress (S. H.) & Company	446,979	8.6	.15	34
Kroger Grocery & Baking Co.	1,373,448	16.1‡	.75	61○
Lehigh Valley Coal Corp.	370,210	28.0	.26	55
Libbey-Owens-Ford Glass Co.	512,355	8.4	.20	82[7]
Libby, McNeill & Libby	282,220	18.8	.08	33■
Liquid Carbonic Corporation	247,120	22.7	.35	70
Long-Bell Lumber Company	322,048	38.2	1.01	56
Loose-Wiles Biscuit Company	517,596	38.4	.94	58
Louisville & Nashville R. R.	2,813,460#	27.3	2.40	110
McCall Corporation	136,704	26.8	.26	66
McCrory Stores Corporation	271,763	13.4	.26	26

(FOR FISCAL YEAR 1940) Name of Company	1940 Social Security Taxes*	Per Cent of Company's Total Taxes	Average Cost per Share (Com.-Pfd.)	Average Cost per Employe
McGraw-Hill Publishing Co.	$ 90,000	20.0%	$0.15	$ 55
McLellan Stores Company	143,703	23.9	.19	24
Mead Corporation	213,936	22.4	.31	53
Mengel Company	145,000	39.8	.30	31
Minneapolis-Honeywell Reg. Co.	202,086	12.9	.31	84
Missouri Pacific R. R. Co.	2,450,386#	42.8	1.58	113
Mohawk Carpet Mills	202,151	13.9	.37	43
Motor Wheel Corporation	219,537	12.8	.26	69
Mullins Manufacturing Corp.	126,113	42.3	.22	72
National Biscuit Company	1,076,000	13.4	.16	56
National Cash Register Co.	573,722	29.3	.35	60[6]
National Dairy Products Corp.	2,540,000	25.4	.41	71
National Gypsum Company	157,777	19.0	.12	48
National Supply Company	484,718	22.4	.28	63
Neisner Brothers, Inc.	129,000	11.3‡	.57	29
New York Central R. R. Co.	10,804,796#	31.7	1.68	117
Niagara Hudson Power Corp.	802,657	4.6	.08	69
Ohio Oil Company	323,043	3.1†	.05	57
Otis Elevator Company	504,553	28.2	.24	85
Owens-Illinois Glass Co.	980,918	23.3	.37	61
Pacific Gas & Electric Company	968,000	4.3	.08	76
Packard Motor Car Company	856,457	20.8‡	.06	76
Penney (J. C.) Company	1,179,417	13.3	.43	24
Pennsylvania Railroad Co.	12,447,564#	28.2	.95	114
Peoples Gas Light and Coke Co.	340,881	7.0	.52	72
Phelps Dodge Corporation	777,189	11.0	.15	62
Pillsbury Flour Mills Co.	232,136	27.0	.42	74
Pittsburgh Screw & Bolt Corp.	109,304	15.1	.07	65
Pullman Incorporated	2,222,331#	31.0	.58	80
Pure Oil Company	576,454	1.4†	.12	61○
Quaker Oats Company	214,889	9.3	.24	53
Republic Steel Corporation	3,763,000	23.5	.62	67
Revere Copper & Brass Inc.	537,706	13.3	.60	68
Ruberoid Co.	159,911	28.0	.40	54
Rustless Iron & Steel Corp.	96,519	6.6	.10	74
Sears, Roebuck & Co.	2,776,994	8.5	.49	43
Servel, Inc.	231,057	11.5†	.13	61
Shattuck (Frank G.) Company	324,604	32.5[9]	.27	43
Sheaffer (W. A.) Pen Company	76,791	16.2	.48	55
Shell Union Oil Corporation	2,209,917	2.7†	.16	92○
Silver King Coalition Mines Co.	33,091	17.4	.03	59
Socony-Vacuum Oil Company	2,978,102	2.3†	.10	80▲
Southern Calif. Edison Co. Ltd.	303,226	3.3	.05	67
Spiegel, Inc.	224,259	22.8	.16	41■
Standard Brands Incorporated	617,248	5.4	.05	59
Standard Oil Company (N. J.)	4,184,419	2.9‡●	.15	86▲
Stewart-Warner Corporation	330,572	17.8	.27	62
Swift and Company	3,630,700	33.1	.61	60
Texas Corporation	1,964,922	1.6†	.18	67[10]
Texas Gulf Sulphur Company	66,000	1.6	.02	99
Tide Water Associated Oil Co.	792,628	2.2†	.12	76
Timken-Detroit Axle Company	326,115	9.9	.33	82
Transcont'l & Western Air Inc.	169,836	75.3	.18	61○
Union Pacific Railroad Co.§	4,338,344#	27.4	1.35	122
United Carbon Company	46,781	3.8	.12	57
United Drug, Inc.	700,000[6]	38.7	.52	45
United Gas Improvement Co.	740,702[11]	3.7	.03	56
United States Rubber Co.	2,425,096	9.3‡	1.02	58
United States Steel Corp.	17,288,507	20.2	1.40	68
Walgreen Company	508,481	14.8‡	.37	39
Western Union Telegraph Co.	2,200,000[6]	37.3	2.10	43○
Westinghouse Air Brake Co.	492,849	9.9	.16	72
Westinghouse Elec. & Mfg. Co.	4,026,234	17.9	1.51	76
White Motor Company	309,382	15.4‡	.50	70
Woolworth (F. W.) Co.	2,082,802	13.5	.21	29
Yellow Truck & Coach Mfg. Co.	763,409	10.0	.24	88
Young Spring & Wire Corp.♦	166,985	32.6	.41	34
Youngstown Sheet & Tube Co.	1,645,000	29.9	.90	68
TOTAL for 152 Companies	$204,983,786			
Average per Company		10.1%	$0.36	$ 68

Note: Unless otherwise indicated, for companies having subsidiaries, the taxes and employes figures are on a consolidated basis; the figure for number of shares is for parent company only.

▲Domestic employes only. †Total tax figure used included excise taxes amounting to more than 50 per cent of total. ‡Total tax figure used included excise taxes amounting to between 25 and 50 per cent of total. ■Approximate number of employes used. ⊗For parent company only. ●For domestic operations only. ○Number of employes at end of year. #Includes railroad retirement taxes. ♦Fiscal year changed—Bendix Corp. report for 9 months ending Sept. 30, 1940; Young Corp. report for 7 months ending July 31, 1940. §Including its leased lines. [1]Employes for U. S. and Canada only. [2]Foreign subsidiaries not included. [3]Total tax figure included Canadian taxes, stated in U. S. dollars, in amount of $819,691. [4]Operating department only. [5]Does not include English and Continental European subsidiaries. [6]Approximately. [7]Factory employes. [8]Factory and field employes. [9]Total tax figure used was approximate. [10]Excludes European employes. [11]Does not include social security taxes charged to accounts other than operating.

**NOTE:* Old-age benefit and Federal and state unemployment taxes. Old-age insurance taxes included in this tabulation do not include the portion paid by workers under the Social Security Act.

■ Bridge over channel leading, southbound, to the Davis and Sabin locks. Below, ore carriers awaiting removal of wreckage to pass through locks. NEA photos

Little Wreck, Big Blockade; Soo Facilities Scrutinized

■ RENEWED demands for more adequate locking facilities at Sault Ste. Marie were made last week after collapse of the large bridge over the St. Mary's river had blocked the iron ore movement for nearly 48 hours.

Ralph Budd, defense transportation commissioner, called on Congress to appropriate funds for rebuilding the Weitzel lock and revealed that the former National Defense Advisory Commission had approved the project. He also pointed out that the project had been recommended by the United States Army Engineer Corps, and that the proposal now is before the house rivers and harbors committee.

Ore traffic was halted early in the morning of Oct. 7 when the bridge crumpled beneath a freight train, throwing the locomotive and two cars into the river. Investigation indicated the leaves of the jack-knife bridge failed to clamp, although the indicators in the bridge tender's office showed the leaves had locked.

The wreckage effectively blocked the Davis and Sabin locks, and it was reported that more than 100 vessels were anchored above and below the locks at times. Compensating dams over the rapids were opened to permit passage of ships drawing 18½ feet through the other locks.

By the morning of Oct. 9 the wreckage had been cleared away sufficiently to permit use of one of the two main locks and movement of the larger ships was resumed.

Estimates of the loss in ore movement averaged around 500,000 tons. This loss, shippers said, can be made up easily if favorable weather conditions prevail at the close of the season or by revised scheduling of vessel trips. The accident will not change materially the estimated movement of 76,000,000 tons of ore during the season.

Potential Scrap Throughout the Land

■ Nearly every public square and park in the country has its war relics, mainly artillery pieces, so commonplace they have practically lost their significance. In a peace-loving land an excess number of them seems strangely out of place. Thousands could be scrapped, clearing sidewalks and small areas, still leaving many for museums and monuments. These views in Cleveland are typical

■ Cleveland's Public Square is composed of four square sections. In addition to the three cannon shown here, one each on three sections, one section is devoted entirely to an elaborate monument, surmounted with bronze statuary representing American soldiers and sailors.

Top photo, rifle captured from the Spanish fleet at Santiago, Cuba, July 3, 1898; upper right, Civil war field piece; right, from War of 1812

First the Lady, Then the Welder

■ "What water is that out there?"

"That's Lake Erie."

"What's on the other side?"

"Canada . . . Where you from?"

"Indiana. Just got into Sandusky yesterday, looking for a job."

The stranger viewed the landscape as the bus sped on toward Cleveland. The native son resumed reading the morning newspaper.

Now that report of Mrs. Roosevelt's broadcast about Russia was interesting—Russia a dictatorship; really no religious freedom. Just as some one starts to whitewash the Reds the First Lady exercises the right of free speech. Laughing elbows! The stranger opened up again.

"Could you tell me where I'll find the headquarters of the Steel Workers' Organizing Committee?"

"Why, I'm not sure, but I think it's on . . . (so and so street.) No, come to think of it, that might be AFL headquarters. But, if it isn't the SWOC they'll tell you where to go." (Soberly) . . . "Are you a steel worker?"

"Yeh, a welder; all my life. I went to Sandusky to get a job on the government TNT plant there, but they told me all the hiring is being done by the union in Cleveland. Gotta see SWOC."

"If you are a welder you shouldn't have any trouble getting a good job over there"—pointing to a shipyard. "They're working day and night for the government, and need welders."

"Oh, yeh? Not for me. I was told about them first thing. If I get on the TNT plant I can make twice as much as they pay. But I gotta sign up!"

The native son went on reading the newspaper, and talking to himself . . . Some persons sometimes are refreshingly frank! Russia . . . "No fundamental difference," said the Lady . . . "Gotta see SWOC . . . gotta sign up" . . . the welder, and many thousands like him, as everyone knows . . . and Little David said: "We must smite the enemies of democracy wherever we find them."

STEEL

A Message with a Hollow Sound

■ A. F. OF L. is holding a convention in Seattle, Wash. President Roosevelt sent a message to the convention. In it he said:

"This is not the time to take chances with national safety through any stoppage of defense work or defense production. Our program of defense—our production of ships, planes, guns, tanks—must be all-out. It shall be limited by only one factor—the amount necessary to overwhelm the Nazi hordes."

What a pitifully weak, inadequate and meaningless statement this is, considering the circumstances under which it was uttered!

• • •

A. F. of L., to whom the message was directed, has made no appreciable effort to get rid of the ex-convicts, thugs and racketeers who infest its officialdom. It has extorted millions of dollars in excessive initiation fees from workers on government defense jobs.

On Jan. 1, 1941, the metal trades department of A. F. of L. pledged to the government and to the American public that there would be no stoppage of work on defense jobs, insofar as the members of the metal trades unions of A. F. of L. were concerned.

This pledge was reiterated at the Seattle meeting now in session, but it means little because at the time the pledge was reaffirmed five of the 24 strikes then in progress on U. S. navy projects were instigated by metal trades unions of A. F. of L.

We hate to say it, but the President's statement that defense effort "shall be limited by only one factor—the amount necessary to overwhelm the Nazi hordes" is just as deceptive as the broken pledges of A. F. of L.

On the basis of our present experience with government policy on labor matters, the President could have said—and said it more truthfully—that defense efforts "shall be limited only by one factor—the amount of work stoppage the administration will condone while it encourages professional labor union organizers to reap the harvest of their recently acquired franchise for exploiting employes, employers and the public."

That franchise was granted by the Wagner act, the avowed purpose of which is to insure for employes the right to "bargain collectively through representatives of their own choosing." But, as it has been administered, the act has served to empower labor union leaders to practice "collective coercion" upon employes, employers and the public.

• • •

Aside from the great injustices attributed to the Wagner act, it now must be held responsible for sabotaging the defense program. The record of work stoppages last week was not reassuring. On the contrary, it was alarming.

There is nothing in sight to indicate improvement in the future, except perhaps the wish—the hope—the prayer—that the President may see the light in time.

E. L. Shaner

EDITOR-IN-CHIEF

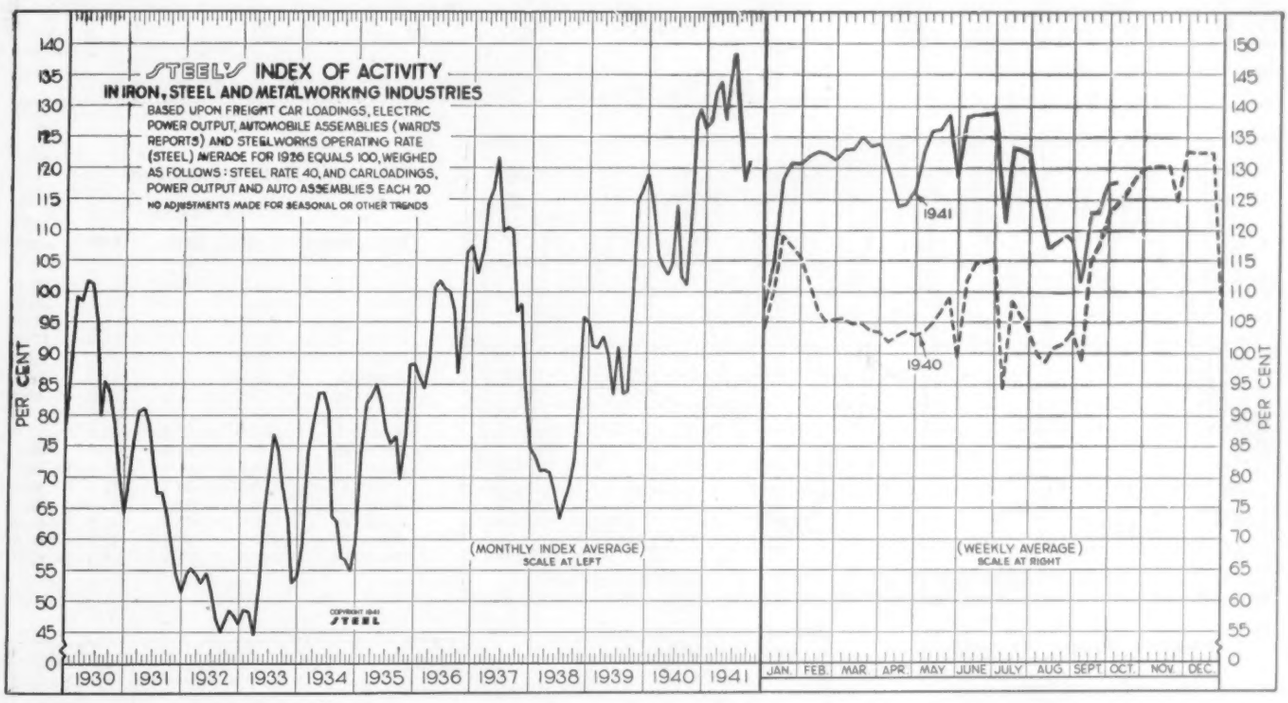
Oct. 13, 1941

The *BUSINESS TREND*

Index of Activity Moves Up Moderately

■ THE expanding defense program continues to make additional inroads into our industrial economy. This condition is clearly illustrated in the recent OPM production limitation order covering mechanical refrigerators. Output must be cut on an average of 43.2 per cent below monthly factory sales for the year ended June 30, last. Similar orders are expected soon covering other household electrical devices. Homes of defense workers are to get the first call on materials under the new housing priorities rules. The automotive industry is of course on limited production schedule under OPM order, but to date has failed to even achieve these quotas due to shortages of materials and labor disturbances in some instances.

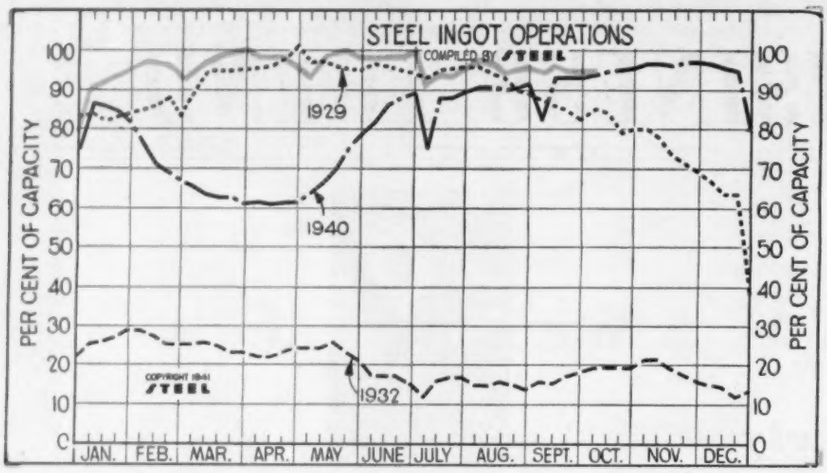
Lengthening working hours with accompanying overtime payments and more liberal wage rates have accounted for bulging payrolls in recent months. In the manufacturing industry as a whole payrolls are up 60 per cent since the spring of 1940, and 120 per cent from mid-1938, according to the Department of Labor's index. However, a serious unemployment problem, in some instances only temporary, appears in the offing, reflecting the expected curtailment in operations among many civilian goods industries.


STEEL'S INDEX OF ACTIVITY
IN IRON, STEEL AND METALWORKING INDUSTRIES
BASED UPON FREIGHT CAR LOADINGS, ELECTRIC POWER OUTPUT, AUTOMOBILE ASSEMBLIES (WARD'S REPORTS) AND STEELWORKS OPERATING RATE (STEEL) AVERAGE FOR 1936 EQUALS 100, WEIGHED AS FOLLOWS: STEEL RATE 40, AND CARLOADINGS, POWER OUTPUT AND AUTO ASSEMBLIES EACH 20
NO ADJUSTMENTS MADE FOR SEASONAL OR OTHER TRENDS
PER CENT
(MONTHLY INDEX AVERAGE) SCALE AT LEFT
(WEEKLY AVERAGE) SCALE AT RIGHT
1941
1940
1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

STEEL'S index of activity gained 0.5 point to 128.0 in the week ended Oct. 4:

Week Ended	1941	1940
July 19	133.2	106.0
July 26	132.9	103.4
Aug. 2	123.3	99.7
Aug. 9	117.5	98.4
Aug. 16	118.2	100.8
Aug. 23	118.5	101.4
Aug. 30	118.2	103.5
Sept. 6	111.8	98.7
Sept. 13	122.3	114.9
Sept. 20	122.9	124.4
Sept. 27	127.5	122.8
Oct. 4	128.0	124.4

Mo. Data	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930
Jan.	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6
Feb.	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2
March	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4	98.6
April	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7
May	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2
June	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8
July	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9
Aug.	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4
Sept.	121.1	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7
Oct.	.....	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8
Nov.	.....	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0
Dec.	.....	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.8



Steel Ingot Operations

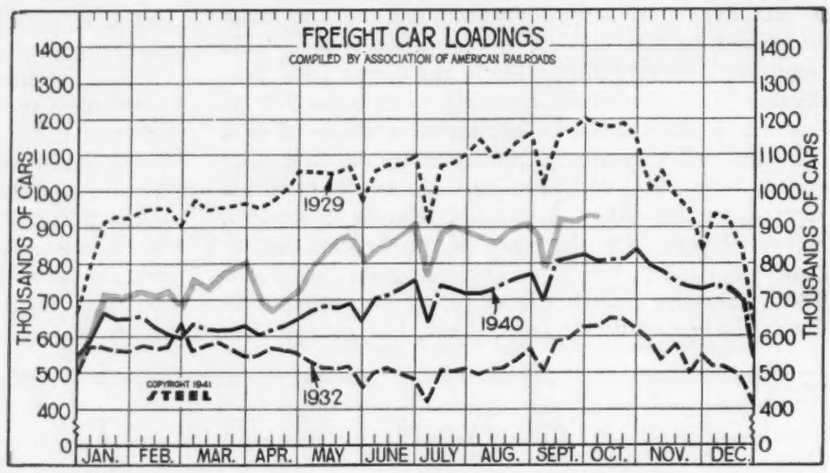
(Per Cent)

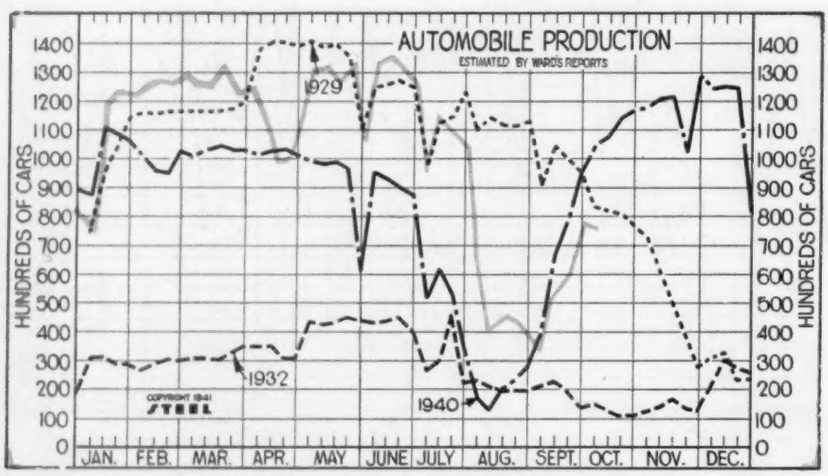
Week ended	1941	1940	1939	1938
Oct. 4....	96.0	93.5	87.5	48.5
Sept. 27....	96.0	93.0	84.0	47.0
Sept. 20....	96.0	93.0	79.5	48.0
Sept. 13....	96.5	93.0	74.0	46.0
Sept. 6....	95.5	82.0	62.0	41.5
Aug. 30....	96.5	91.5	64.0	44.5
Aug. 23....	96.0	90.5	63.5	43.5
Aug. 16....	95.5	90.0	63.5	41.5
Aug. 9....	96.0	90.5	62.0	40.0
Aug. 2....	97.5	90.5	60.0	40.0
July 26....	96.0	89.5	60.0	37.0
July 19....	95.0	88.0	56.5	36.0
July 12....	95.0	88.0	50.5	32.0
July 5....	92.0	75.0	42.0	24.0
June 28....	99.5	89.0	54.0	28.0
June 21....	99.0	88.0	54.5	28.0
June 14....	99.0	86.0	52.5	27.0

Freight Car Loadings

(1000 Cars)

Week ended	1941	1940	1939	1938
Oct. 4.....	918	806	835	703
Sept. 27.....	920	822	835	698
Sept. 20.....	908	813	815	676
Sept. 13.....	914	804	806	660
Sept. 6.....	798	695	667	569
Aug. 30.....	912	769	722	648
Aug. 23.....	900	761	689	621
Aug. 16.....	890	743	674	598
Aug. 9.....	879	727	665	590
Aug. 2.....	883	718	661	584
July 26.....	897	718	660	589
July 19.....	899	730	656	581
July 12.....	876	740	674	602
July 5.....	740	636	559	501
June 28.....	909	752	666	589
June 21.....	886	728	643	559
June 14.....	863	712	638	556





Auto Production

(1000 Units)

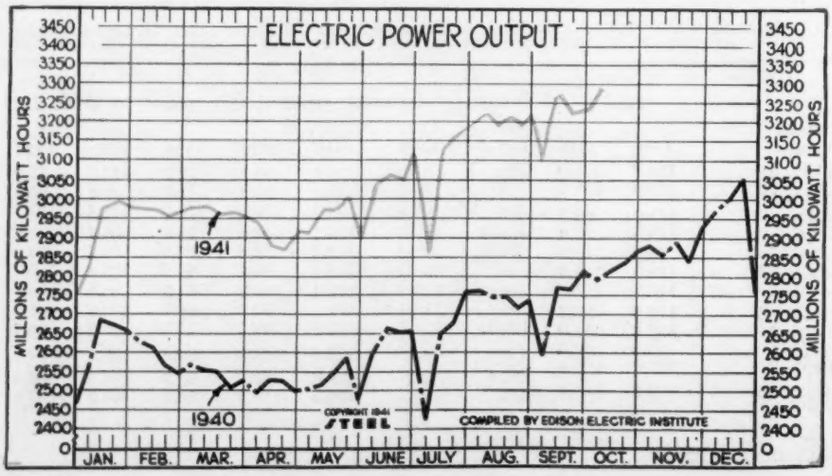
Week ended	1941	1940	1939	1938
Oct. 4....	76.8	105.2	76.1	37.7
Sept. 27....	78.5	96.0	62.8	25.4
Sept. 20....	60.6	78.8	54.0	20.4
Sept. 13....	53.2	66.6	41.2	16.1
Sept. 6....	32.9	39.7	26.9	17.5
Aug. 30....	40.0	27.6	25.2	22.2
Aug. 23....	45.5	23.7	17.5	18.7
Aug. 16....	45.6	20.5	13.0	23.9
Aug. 9....	41.8	12.6	24.9	13.8
Aug. 2....	62.1	17.4	28.3	14.8
July 26....	105.6	34.8	40.6	30.4
July 19....	109.9	53.0	47.4	32.1
July 12....	114.3	65.2	61.6	42.0
July 5....	96.5	52.0	42.8	25.4
June 28....	127.9	87.6	70.7	40.9
June 21....	133.6	90.1	81.1	40.9
June 14....	134.7	93.6	78.3	41.8

Electric Power Output†

(Million KWH)

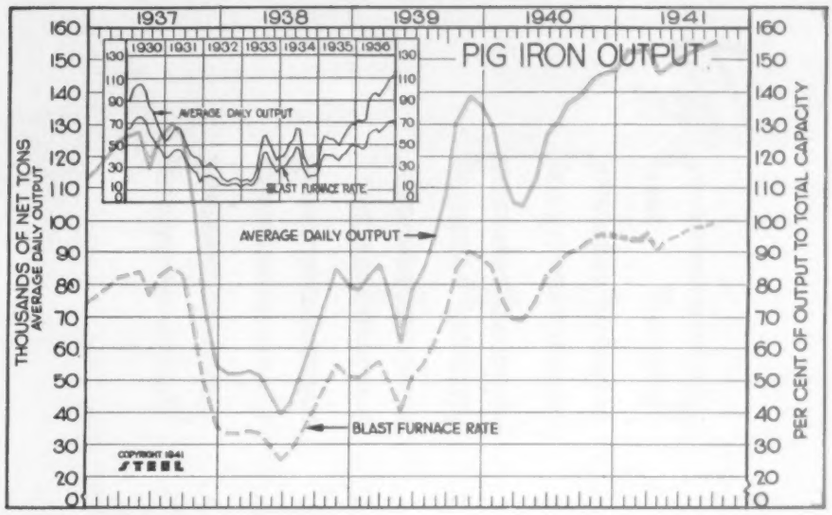
Week ended	1941	1940	1939	1938
Oct. 4.....	3,290	2,792	2,554	2,229
Sept. 27.....	3,233	2,816	2,559	2,208
Sept. 20.....	3,232	2,769	2,538	2,211
Sept. 13.....	3,281	2,773	2,532	2,279
Sept. 6.....	3,096	2,592	2,376	2,110
Aug. 30.....	3,224	2,736	2,442	2,217
Aug. 23.....	2,193	2,714	2,434	2,202
Aug. 16.....	3,201	2,746	2,454	2,207
Aug. 9.....	3,196	2,743	2,414	2,198
Aug. 2.....	3,226	2,762	2,400	2,194
July 26.....	3,184	2,761	2,427	2,160
July 19.....	3,163	2,681	2,295	2,085
July 12.....	3,141	2,652	2,403	2,154

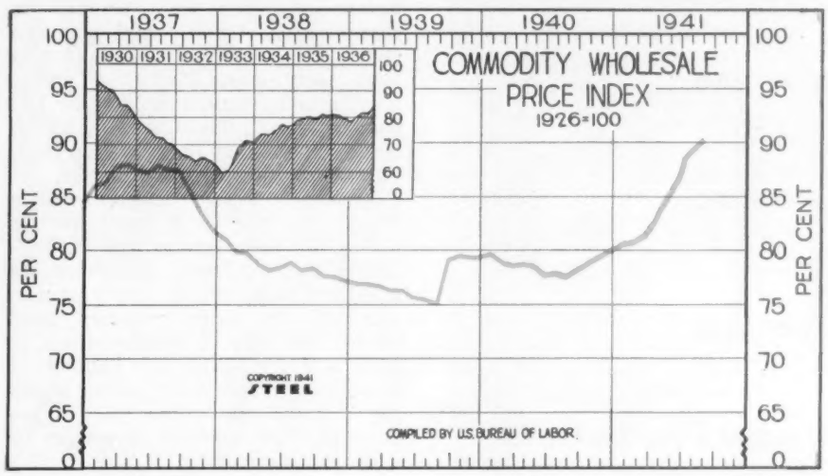
†New series: Includes additional governmental and power generation not previously reported.


ELECTRIC POWER OUTPUT
MILLIONS OF KILOWATT HOURS
1941
1940
COPYRIGHT 1941 STEEL
COMPILED BY EDISON ELECTRIC INSTITUTE
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

Pig Iron Production

	Daily average —Net Tons—			Blast furnace —Rate (%)—		
	1941	1940	1939	1941	1940	1939
Jan.	150,524	129,825	78,596	95.5	85.4	51.0
Feb.	150,244	113,943	82,407	95.3	75.0	53.5
Mar.	151.707	105,502	86,465	96.3	69.5	56.1
Apr.	144,685	104,635	76,732	91.8	68.9	49.8
May	148,262	112,811	62,052	94.1	74.2	40.2
June	151,701	127,103	79,125	95.7	83.6	51.4
July	153,749	130,984	85,121	97.0	86.1	55.0
Aug.	154,343	136,599	96,122	97.4	89.9	62.4
Sept.	157,510	139,085	107,298	99.4	91.5	69.7
Oct.	.....	143,152	131,053	....	94.2	85.2
Nov.	.....	146,589	138,883	....	96.4	90.3
Dec.	.....	146,544	136,119	....	96.4	88.5
Ave.	.....	128,128	86,375	....	84.3	62.6





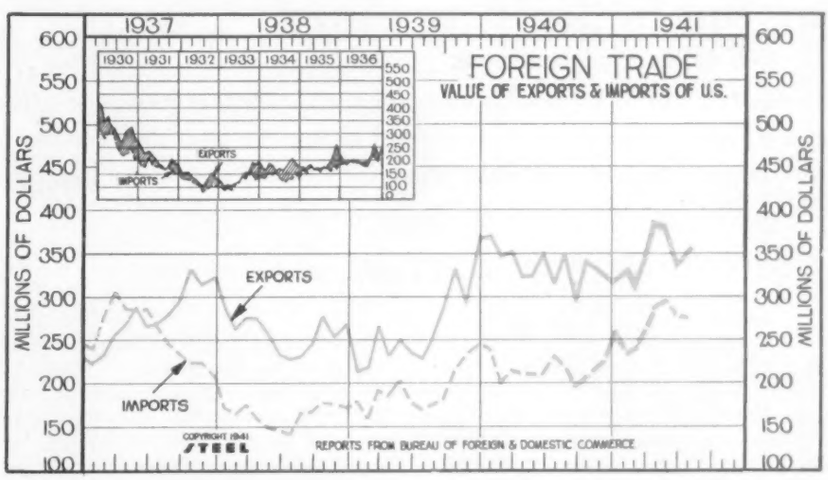
All Commodity Wholesale Price Index
U. S. Bureau of Labor
(1926 = 100)

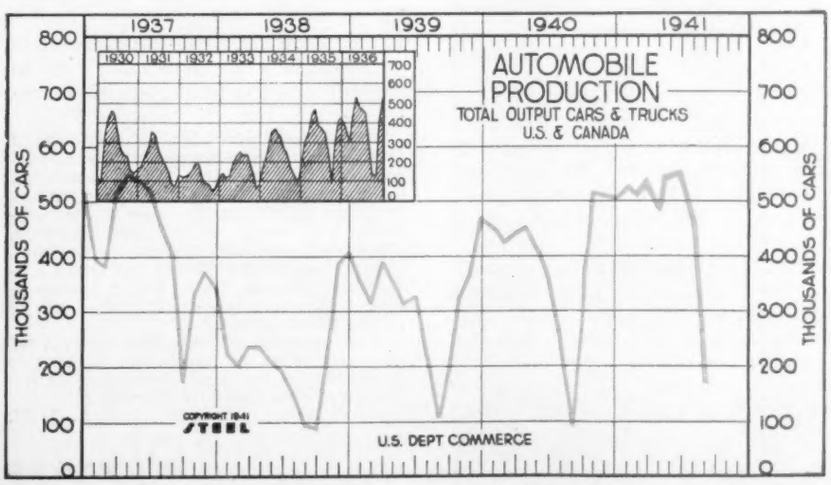
	1941	1940	1939	1938	1937
Jan.	80.8	79.4	76.9	80.9	85.9
Feb.	80.6	78.7	76.9	79.8	86.3
March	81.5	78.4	76.7	79.7	87.8
April	83.2	78.6	76.2	78.7	88.0
May	84.9	78.4	76.2	78.1	87.4
June	87.1	77.5	75.6	78.3	87.2
July	88.8	77.7	75.4	78.8	87.9
Aug.	90.3	77.4	75.0	78.1	87.5
Sept.	....	78.0	79.1	78.3	87.4
Oct.	....	78.7	79.4	77.6	85.4
Nov.	....	79.6	79.2	77.5	83.3
Dec.	....	80.0	79.2	77.0	81.7
Ave.	....	78.5	77.1	78.6	86.3

United States Foreign Trade

(Unit: $1,000,000)

	Exports		Imports	
	1941	1940	1941	1940
Jan.	$325.4	$368.6	$228.7	$241.9
Feb.	303.4	347.0	233.7	199.8
Mar.	357.6	352.3	267.8	216.7
April	385.5	324.0	287.6	212.2
May	384.6	325.3	296.9	211.5
June	337.7	350.2	279.5	211.4
July	358.6	317.0	277.8	232.3
Aug.	.....	349.9	.....	220.5
Sept.	.....	295.2	.....	194.9
Oct.	.....	343.5	.....	207.1
Nov.	.....	327.7	.....	223.4
Dec.	.....	322.3	.....	253.1
Total	.....	$4,021.6	.....	$2,625.4





Automobile Production

(Unit: 1000 Cars)

	1941	1940	1939	1938	1937
Jan.	524.1	449.3	357.0	227.1	399.2
Feb.	509.3	421.8	317.5	202.6	383.9
March	533.9	440.2	389.5	238.6	519.0
April	489.8	452.4	354.3	238.1	553.4
May	545.3	412.5	313.2	210.2	540.4
June	546.3	362.6	324.2	189.4	521.1
July	468.8	246.2	218.5	150.4	456.9
Aug.	164.8	89.9	103.3	96.9	405.1
Sept.	.....	284.6	192.7	89.6	175.6
Oct.	.....	514.4	323.0	215.3	338.0
Nov.	.....	511.0	370.2	390.4	376.6
Dec.	.....	506.9	469.0	407.0	346.9
Ave.	.....	391.0	311.0	221.3	418.0

The GARAND semi-automatic RIFLE

. . . . . and its manufacture at Springfield armory

By ARTHUR F. MACCONOCHIE
Head, Department of Mechanical Engineering
University of Virginia
University Station, Va.
And
Contributing Editor, STEEL

Here Professor Macconochie analyzes the action that occurs in firing the Garand, shows how gas is utilized to remove cartridge, feed new one to position and cock gun. Too, the unusual operations involved in manufacture of the gun barrel are detailed

This Is Number 33 In a Series on Ordnance and Its Manufacture, Prepared for STEEL *by Professor Macconochie*

(Concluded from Last Week)

■ SIMPLICITY and relatively few parts are important not only for ease of manufacture but also to facilitate maintenance in the field—providing that excessively complicated shapes are not required. The Garand rifle meets these requirements well since it has a total of only 72 components including springs, screws and pins as compared with 92 for the Springfield—this in addition to the fact that the new gun is semi-automatic instead of single shot.

Its ease of disassembly is striking since only 12 seconds is required to remove the trigger-guard group, stock, operating rod and the bolt. In most weapons the firing pin blow is either directly or indirectly caused by a compressed spring. But as the firing pin moves forward, the energy in the spring decreases so when the spring becomes fatigued, the blow on the primer is materially reduced. In the Garand, the hammer mechanism leverage is increased as the hammer nears the point of impact. This tends to reduce the load on the firing pin at instant of firing—the exact reverse of the force application in the Springfield service rifle.

While many semi-automatic weapons need ammunition specially prepared for them, the Garand is quite flexible and will fire high and low-powered ammunition with equal satisfaction and without any sort of adjustment.

The major features of the Garand, known officially as United States rifle caliber .30 Ml, were conceived in 1929 by John C. Garand, a civilian employe of Springfield armory since 1919. Construction of the first pilot model was authorized Nov. 7, 1929. This unit was completed in October, 1931, and sent to Aberdeen proving ground for test, a process which was repeated twice before 80 rifles were ordered in March, 1932. Upon completion two years later, these rifles were sent to Fort Benning and Fort Riley where service tests were completed by December, 1934. The Garand was officially adopted as the standard United States rifle in January, 1936.

Among those characteristics which resulted in a favorable decision for the Garand are its reliability under adverse conditions, its excellent balance and safety in use. Further, its short receiver commends the rifle to consideration. A long receiver upsets the balance of a rifle, interferes with proper sighting if it extends to the rear, or necessitates an increase in weight or a shorter barrel.

The Garand can be loaded without removing the rifle from the shoulder, the clip being pressed into the receiver with the thumb. When the bolt moves forward, the hammer remains hooked. The presence of some sand and mud among the working parts will not stop the rifle from firing. Oil, however, is admittedly troublesome and its use should be avoided.

Concerning its safety features, the hammer is so constructed that it cannot strike the firing pin before the bolt is rotated to the fully breeched position, making premature discharge very difficult if not impossible. By way of an added safety measure, the firing pin is prevented from traveling forward until the same situation has been established.

The rear sight of the Garand is entirely new in principle. It is mounted on the back part of the re-

The author thanks Mr. John C. Garand for his valuable assistance in the preparation of this article; and expresses his appreciation for the helpful contributions of Jones & Lamson Machine Co., Springfield, Vt.; Pratt & Whitney Division, Niles Bement Pond Co., West Hartford, Conn.; the United States Ordnance Department; United States Office for Emergency Management—in providing many of the illustrations.

This account of the manufacture of shoulder arms at Springfield armory is presented by the kind permission of the United States Chief of Ordnance.

A. F. M.

Top view, United States semi-automatic rifle, caliber .30 Ml—more commonly known as the Garand—as it appears with bayonet for combat action

ceiver, with the aperture quite close to the eye. The longer sight radius thus provided makes for increased accuracy.

Concerning the design of the barrel itself, strength considerations are obviated by the need for having sufficient metal to minimize vibrations and absorb heat. Thus the barrel is stronger than need be merely to resist the bursting forces acting upon it.

For an industry which played a large part in making the concept of interchangeability a working reality, a curious lethargy seemed for a long time to hang over small arms manufacture. But defense efforts and the demand for greater production have focused attention on machine shop practices which as a result are being rapidly revolutionized. It would require a large volume to describe in any detail the multitude of operations on the 72 parts of the Garand. Even to give any adequate impression of the ways in which the broach has been put to use or how many machining

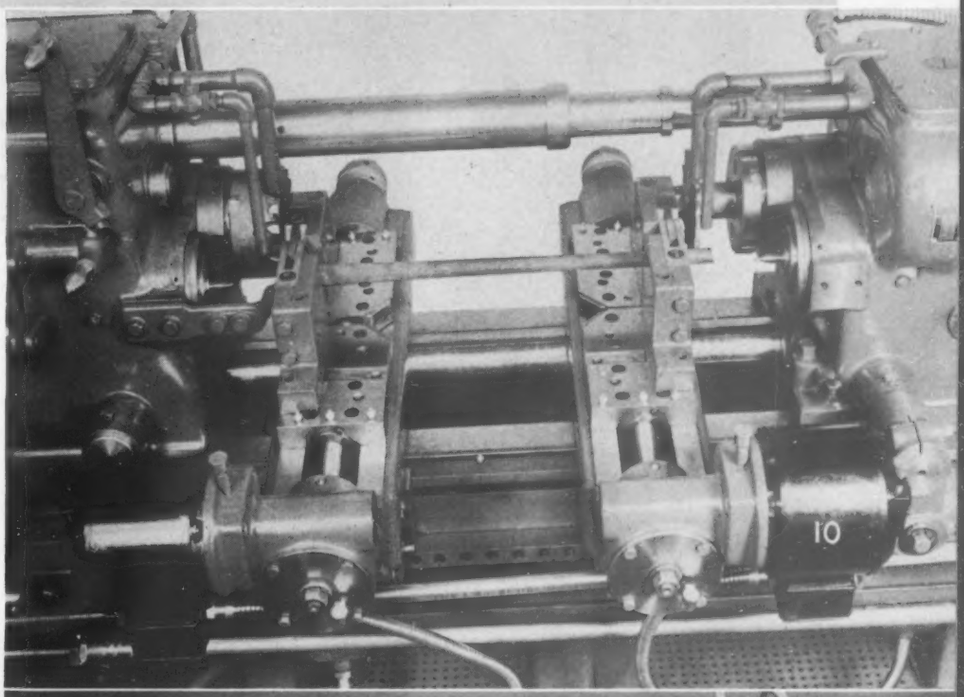


Fig. 10—Rough Garand gun barrel forging first goes into this Jones & Lamson double end milling and centering machine. Lefthand headstock mills large end while righthand headstock saws off surplus stock on small end, using the staggered toothed saw. Fixtures holding forging are fed to rear by individual motors as shown. Upon completion of milling and sawing, work automatically advances to centering station

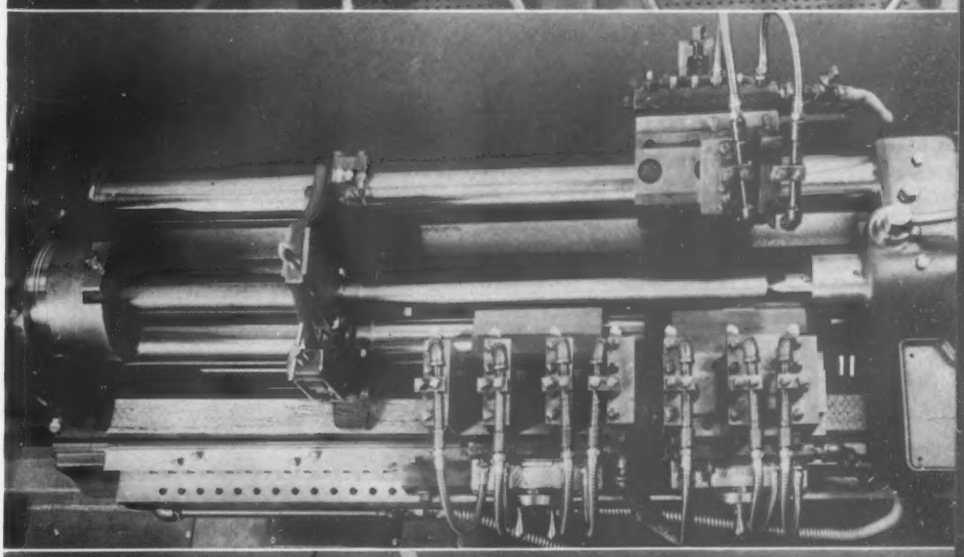


Fig. 11—Closeup of tooling for first rough turning operation on outside of Garand barrel as done on a Jones & Lamson 12-inch Fay automatic lathe: Note steady rest at center left

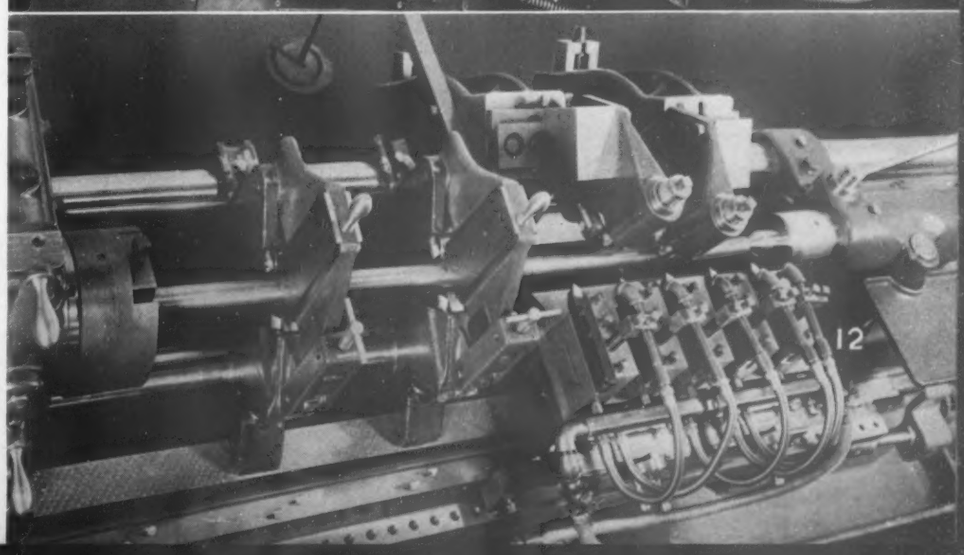
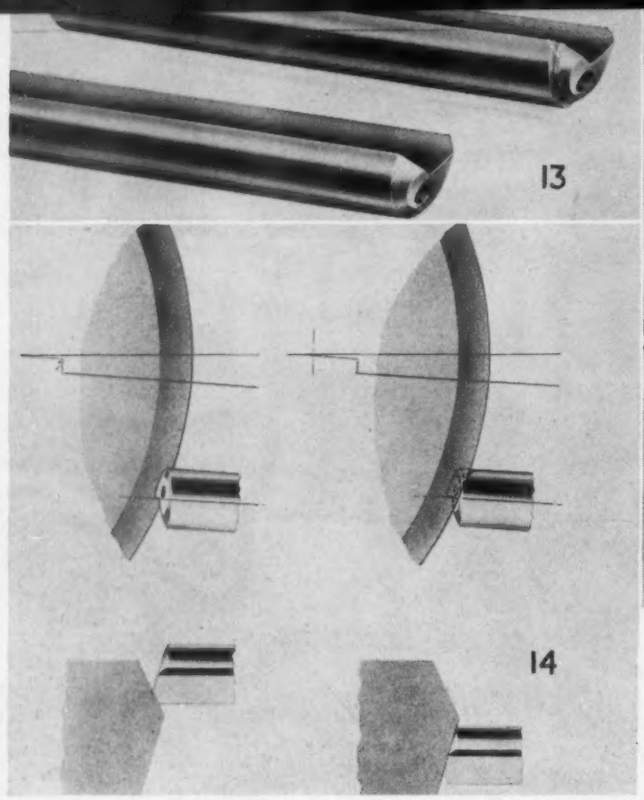


Fig. 12—Closeup of tooling for second rough turning on the rifle barrel, also done on a J & L 12-inch Fay automatic: Special provision has been made to prevent vibration here by means of the two dampers seen mounted towards the muzzle, center right. Two steady rests, center left, are used on barrel



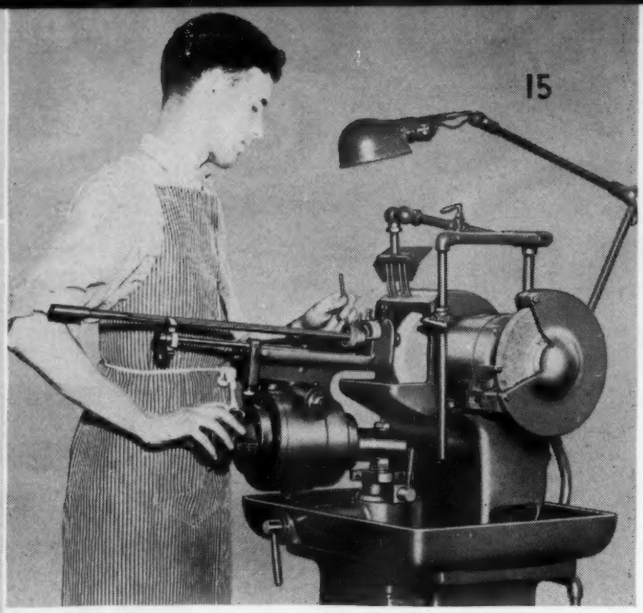


Fig. 13—Bits for drilling barrels: Oil under 500 pounds pressure is pumped through the hollow drill to wash back the chips along the V-groove. This works well since the drill remains stationary with V-groove at top while barrel is revolved

Fig. 14—How deep-hole drilling bits are sharpened, according to Pratt & Whitney Division, Niles Bement Pond Co., West Hartford, Conn., who also supplied Figs. 13 to 24 inclusive

Fig. 15—The long bits for deep-hole drilling are sharpened on this Pratt & Whitney grinder

operations have been avoided altogether by the use of drawn steel bars of special shapes would reach far beyond our present scope.

Suffice it perhaps to indicate the principal lines of development including precision coining of many parts which were formerly machined all over, and the application of the principles of automatic die work to sheet metal parts.

Not so long ago, rifle barrels were being machined tediously with single tools. Now a Fay double-ended automatic cuts the barrel accurately to length and center drills the two ends by rocking the stock backward past two milling cutters and then forward to position for centering and countersinking. After a grinding operation to provide a bearing for a steady near the middle of the barrel, multiple tool operations on Fay lathes are employed to remove excess stock from the outside of the barrel.

This indicates the line of approach —standard common machine tool operations being supplemented by special equipment to handle the unusual jobs, or to speed highly repetitive operations. Since it is in this field that possibly the most interest attaches, we will dwell for a moment on manufacture of the barrel —where several unusual machines and procedures are employed. During machining, about 5½ pounds of metal are removed from the original 8-pound forged blank.

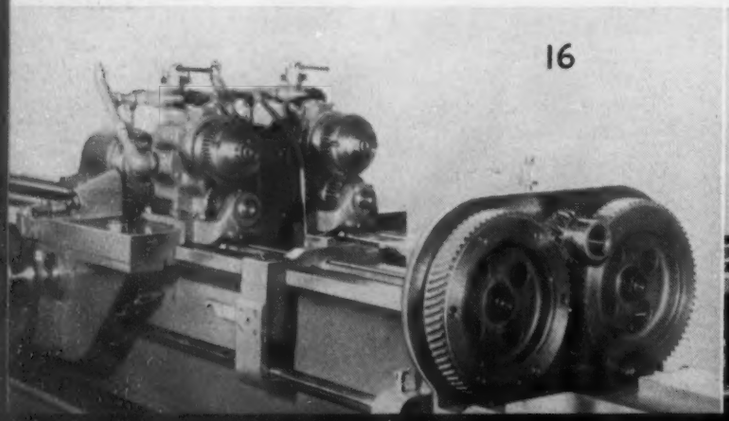
The sequence of machining operations on the barrel starts with end-milling and centering. While the barrel is held in the carriage-holding fixtures shown in Fig. 10, the left headstock mills the large end while the righthand headstock saws off the surplus stock on the small end, using a saw with staggered teeth. The carriage then returns automatically to the centering position and the center drills move forward to center both ends to depth.

Next a driving dog is clamped on one end of the barrel which then is mounted in the Fay automatic shown in Fig. 11 and held in the 3-roll ball-bearing steady rest for the first or rough turning operation on the outside of the barrel. One carriage with four tools turns the long taper diameters and another carriage with three tools turns the two straight diameters on the breech end. The rear arm meanwhile carries a tool to form the taper between the two straight diameters and a chamfering tool to break the corner on the end.

An interesting feature of the second rough turning operation, Fig. 12, is the use of the 2-roll vibration damper shown in this illustration. As before, the work is held between centers and driven by a floating drive plate. Two steady rests, however, are now necessary. The function of the vibration damper with its springloaded rolls is to contact the stock just before the carriage tools start cutting. Then as soon as the carriage tools have rocked in to depth and traveled a sufficient distance, the steady rest rolls automatically contact the turned diameter, while the vibration damper is

Fig. 16—Deep-hole drilling machine furnished by Pratt & Whitney: Guards here have been removed to show the high pressure oil pumps mounted on each of the two drill feeding slides. A 7½-horsepower motor drives the two pumps through the pinion and gears seen at right

Fig. 17—Combination drill guide and work support carriages of the deep-hole drilling machine, Fig. 16: Steady rest at left also helps



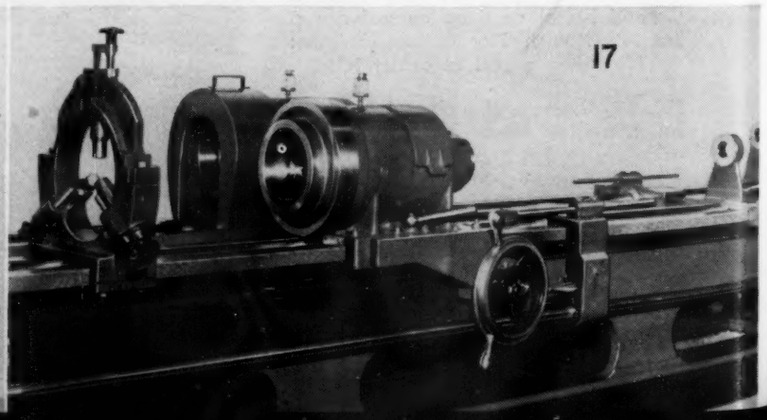


Fig. 18—Deep-hole reaming machine holds work in fixture in work carriage at right while whole unit feeds towards or away from the rotating reamer. Best results usually come from feeding away from the pull-type reamer. Machine employs hydraulic feeds

Fig. 19—Rifling machine holds gun barrel in work spindles at left by means of collet chuck. Rifling tool slides at right drive rifling tools and control pitch of grooves by means of a leader and nut shown in Fig. 20

automatically relieved.

After this second rough turning, the bore is drilled into the solid forging. Since many people would like to know how it is possible to drill a long hole in a bar of steel without its "running out" or becoming crooked, this machining operation can be regarded as sufficiently unusual to be worthy of a detailed description.

The drilling of the hole is carried out by a single fluted drill of the type shown in Fig. 13. Coolant forced through a hole in the drill keeps down the temperature at the cutting tip and washes the chips out of the bore. The drill remains stationary except for the longitudinal feed from the breech end, the barrel being rotated. Fig. 14 exhibits the method of sharpening these drills. The two upper views, which are correct projection, (note that the wheel in the righthand elevation is not lying on its side but is erect) show the relative positions of the drill tip and the wheel when the bevel and its helical relief are being ground. The lower views, Fig. 14, show the grinding of the "flat" and its relief.

The manner of sharpening these drills (see Fig. 15) is rather important since the intention is to produce a small, lightly curled chip which is easily washed away from the cutting edge by the 500-pound oil pressure employed. If the chips clog, "out-of-line" drilling is likely to result.

Drilling operations on gun barrels may either be conducted in a vertical unit or on a horizontal machine of the type shown in Figs. 16 and 17. With the barrel rotating, the drill is slowly fed into the metal while oil under high pressure

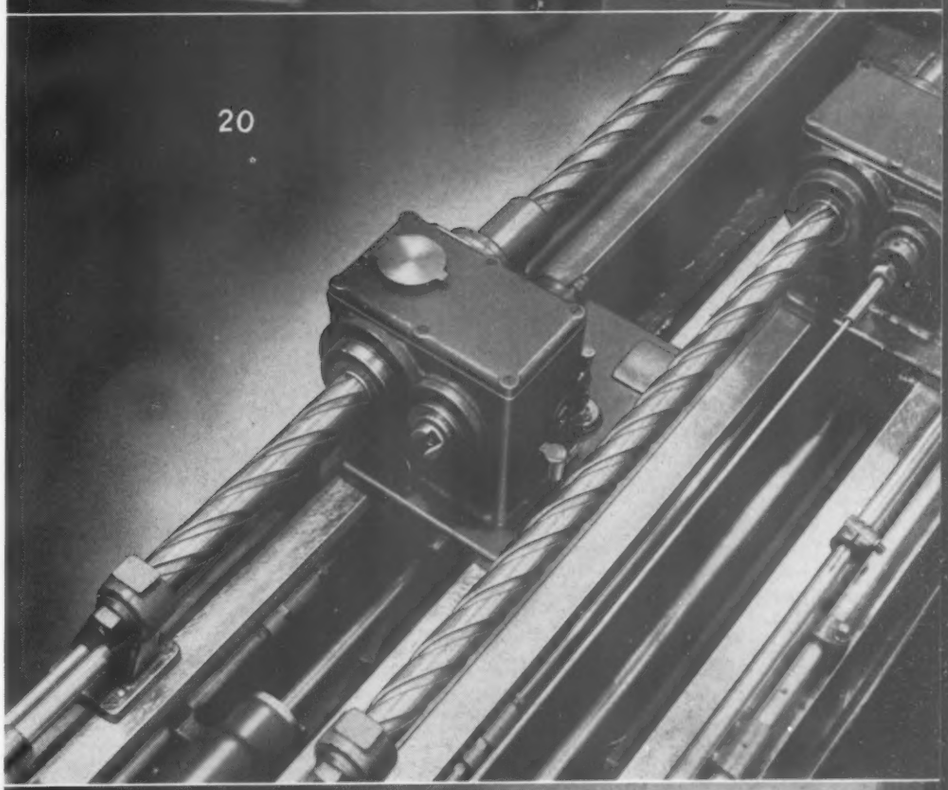


Fig. 20—These are the fixed rifling leaders or spirals. As the heads slide down the spirals, nuts in the heads are caused to revolve, in turn causing the correct helical motion to be transmitted to the cutters to which the nuts are geared

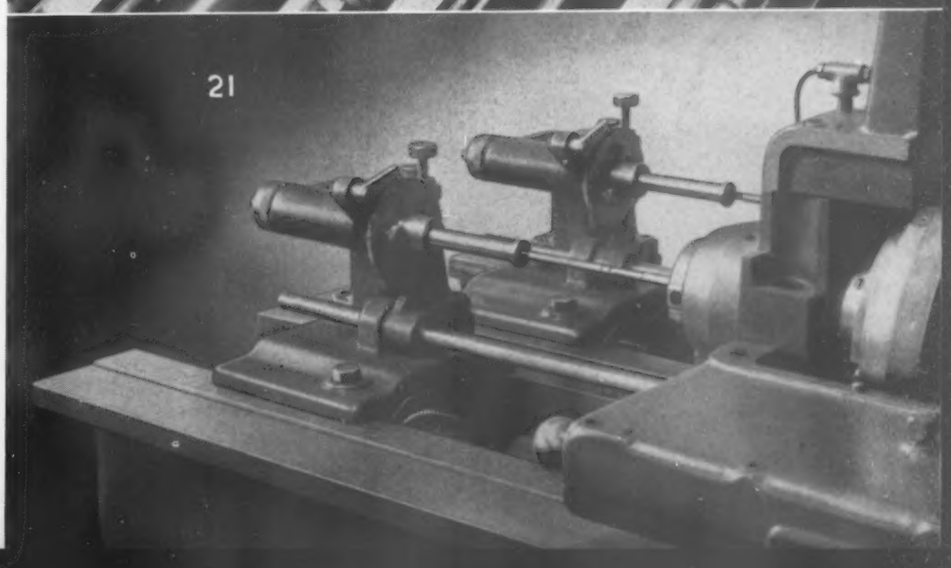


Fig. 21—Closeup of feed mechanism used to advance the hook-type rifling cutter after each complete revolution of the gun barrel: It is hinged to swing aside when changing barrels

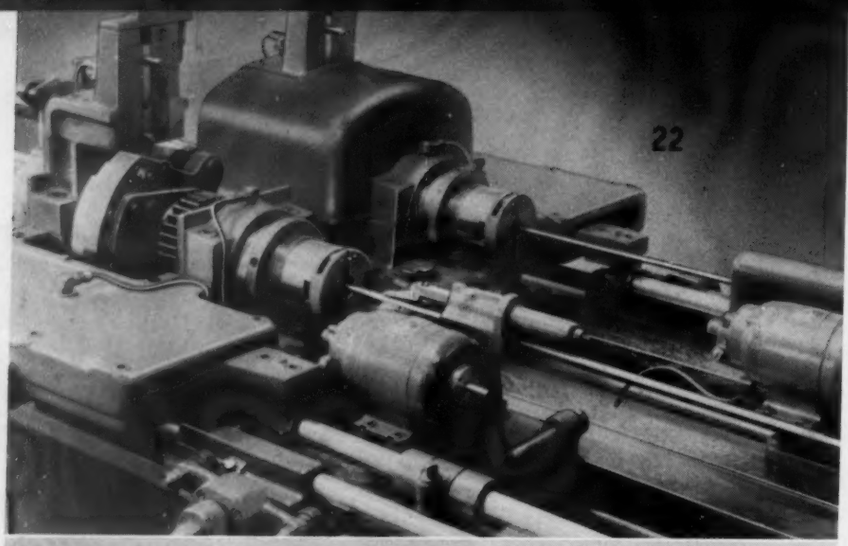


Fig. 22—These are the work spindles of the rifling machine; cover of nearer unit has been removed to show mechanism: Spindles index after each cut. Note motor-driven brush used to remove chips from tool after each pass

Fig. 23—This one machine performs the complete operation of chambering the barrel, preparing the cartridge cavity

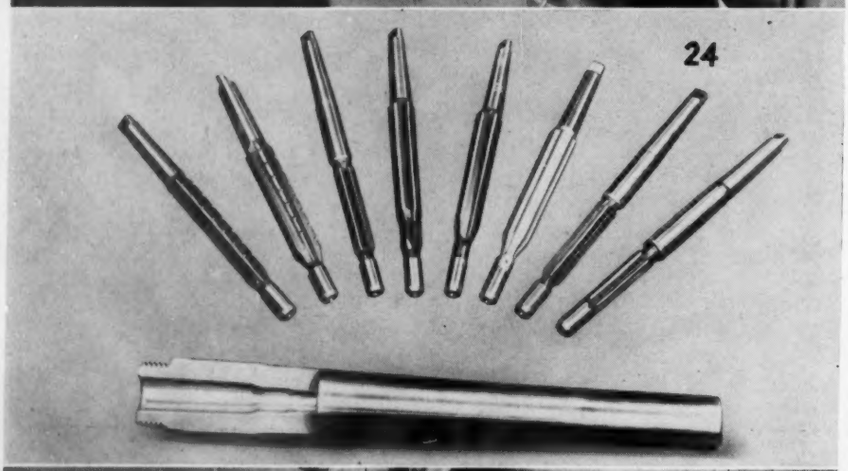


Fig. 24—This is cutaway model of the chamber of a .50-caliber machine gun barrel, showing the set of eight chambering reamers necessary to produce the cavity

Fig. 25—One of the final tests is actual shooting of the gun while carefully held in a special fixture. Accuracy of fire is checked by means of the telescope seen just above the operator's head. Note barricade to protect operator. OEM photo by Palmer

is fed through the hollow drill to run back out the open V of the drill, carrying the chips with it.

Rough reaming follows. This may be done on vertical or horizontal machines of the type shown in Fig. 18. Recent tendencies are toward multiple vertical machines with up to 12 spindles in which the tools are rotated and the barrels are fed up over them.

Another interesting operation is the rifling of the barrel. This is done on a machine of the type shown in Figs. 19, 20, 21 and 22. These machines incorporate two rifling units, each rifle barrel being held in its work spindle by means of a collet chuck. Fig. 20 shows a "close-up" of the fixed rifling leaders or spirals. In the sliding heads are nuts which engage these leaders and which, in turn, are geared to the tool spindles. As the heads move in their ways, the nuts are revolved as they slide down the spirals, transmitting the correct helical motion to the cutters to which they are geared. In Fig. 20 the long cutter shank is in place on the right, while the one on the left has been removed to show the spindle nose. The two heads are not connected together in any way, each moving independently of the other under separate hydraulic drive.

Fig. 21 shows the manner in which the feed advances the hook cutter after the barrel has been indexed through one complete revolution. Rifle being carried out by a "pull" in one direction only, arrangements are provided for withdrawing the cutters into the bar at the end of each working stroke lest injury result to the barrel during the return stroke. On completion of the back stroke, the cutter bar strikes a stop which restores the cutters to the working position. At the same time a nut on the feed bar

(*Please turn to Page* 152)

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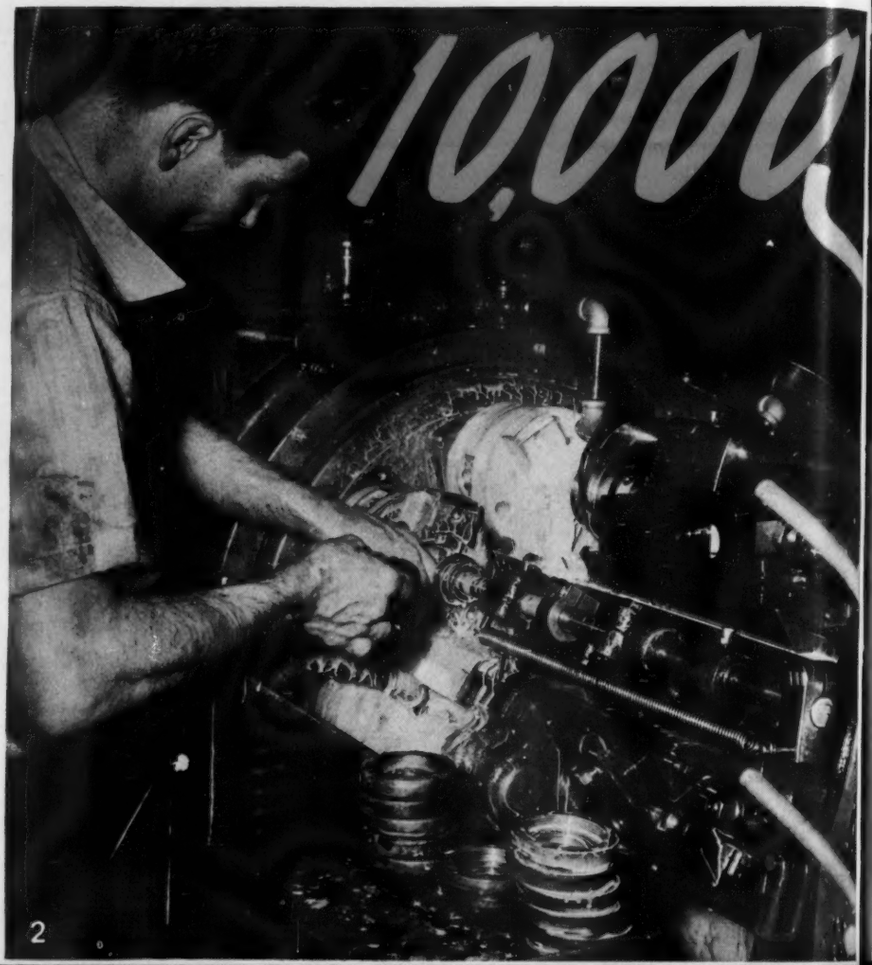
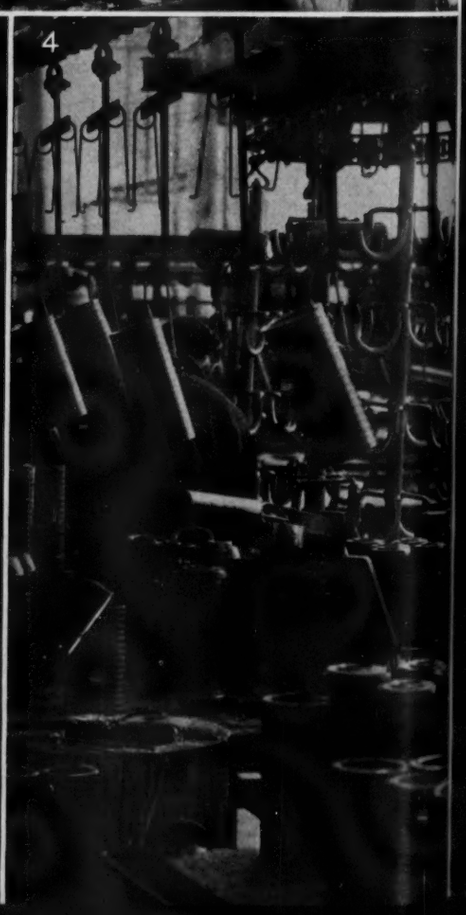


Fig. 1—The coil which fits around the tubing is made from a 16-foot bar reduced to ½-inch square cross section during coiling. Here is loading-unloading station of huge machine which carries coils past a disk grinder that squares off the coil ends as shown at top of wheel. Note heavy chain driving wheel at its outer periphery



Bombs Each Day

■ CASINGS for small bombs are pouring off a production line at the Philadelphia plant of Edward G. Budd Mfg. Co. at a rate of 10,000 a day with the rate still increasing. These 20-pound fragmentation bombs are said to be most effective missiles of this type ever produced. Operations performed at the Budd plant include the forming, machining and assembly of the component parts, after which the units are shipped to Army shell loading stations to be supplied with powder and fuzes.

The bombs consist essentially of a section of thin-wall mechanical tubing, around which is fitted a preformed steel coil. A forged steel base and fuze cap well are threaded to the ends of the tubing. The assembled unit is approximately 12 inches long and 4 inches in diameter, weighing 17 pounds unloaded.

Tubing for the inner casing is cut from long sections to required size by a hydraulic hack saw which accommodates 12 pieces at a time. Ends of the cut pieces then are threaded. Automatic screw machines are used to machine and thread the end forgings.

In forming the coil which fits around the tubing, lengths of steel bars having a keystone-shaped cross section are fed hot to a coiling machine. This irregular section is reduced to a ½-inch square by the coiling operation, thereby causing each layer of the coil to lie flat against the adjoining ones. Each coil requires a bar length of a little over 16 feet.

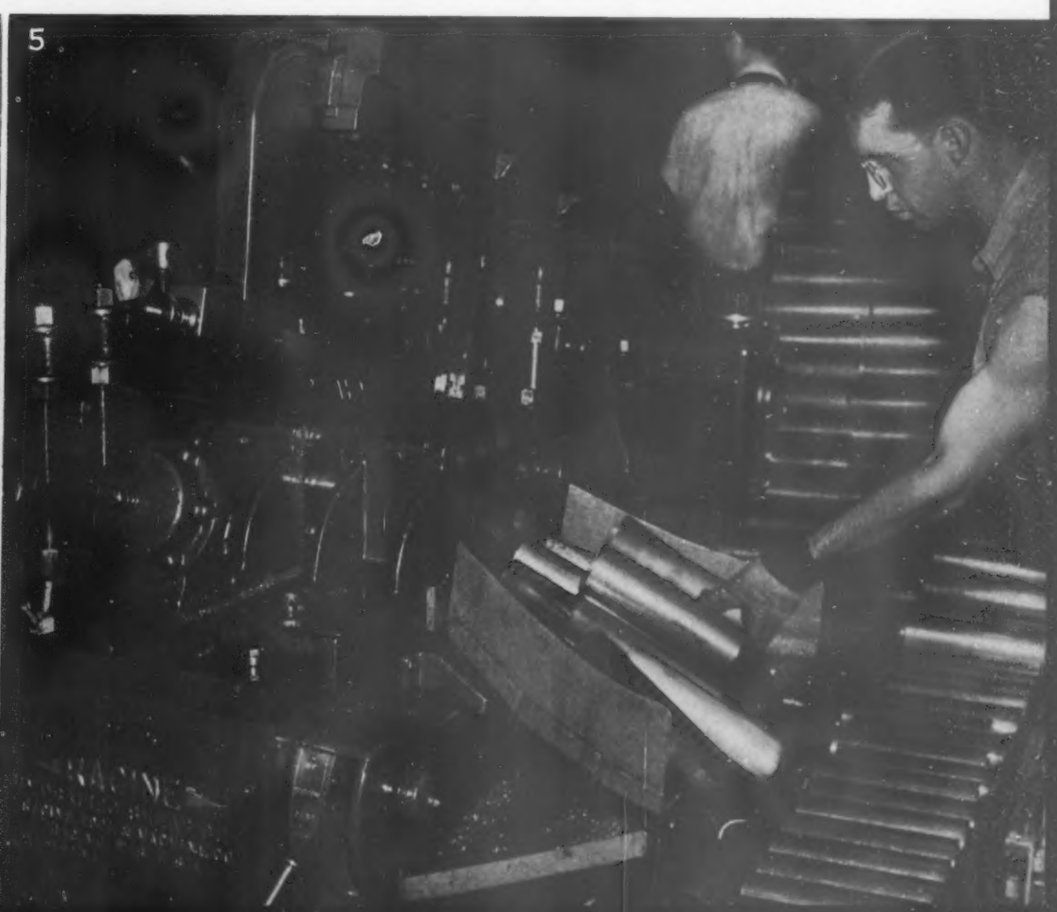
After forming, coils are moved to an assembly station by an overhead conveyor. At the assembly point, operators press the coil over the tube and affix the nose and base forgings. Another similar conveyor takes away the assembled piece for painting and inspection. The bombs then are sealed in a carton, four to a package, and are carried by a belt conveyor to a freight car for loading.

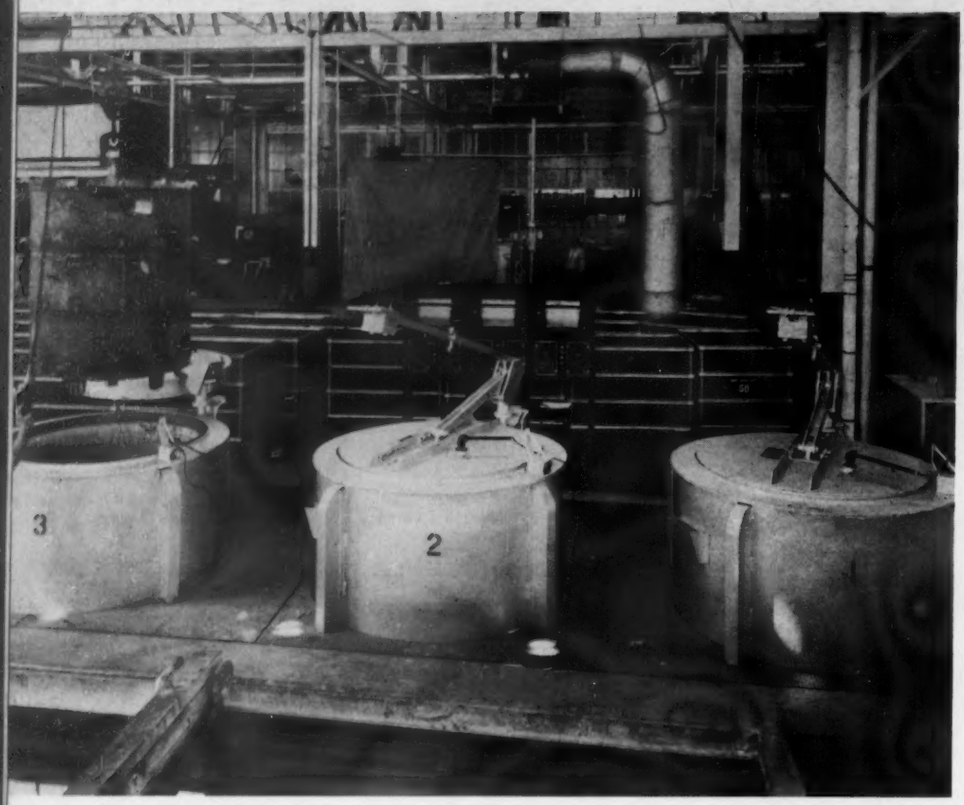
Fig. 2—This is one of the automatic screw machines used to thread and finish the forged pieces which close the end of the bomb casing. Machine is equipped with special fixtures and tools to speed production

Fig. 3—View of assembly line where coil is processed and fastened to tube. Note coils come to line on one overhead conveyor and assembled bombs are taken away on an adjoining conveyor

Fig. 4—Another view of the same assembly line shown in Fig. 3

Fig. 5—Here sections for the inner casing are being cut from thin-walled mechanical tubing by a hydraulic hack saw which cuts through a stack of 12 tubes at high speed





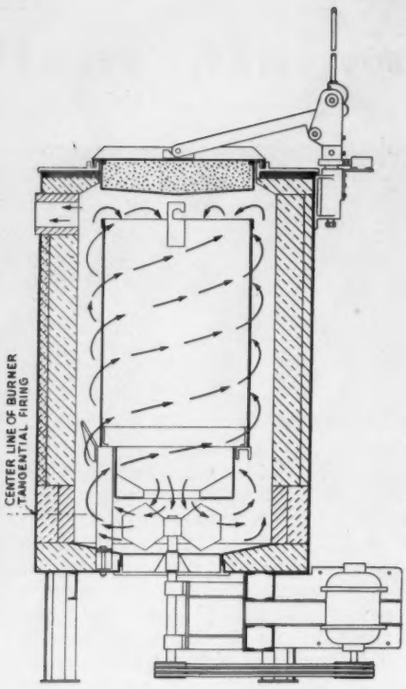


Fig. 1. (Left)—Installation of vertical pit-type furnaces for cup annealing, draw annealing and relief annealing. Note portion of quench, pickle and wash tanks in foreground

Fig. 2. (Right)—General construction and path of heated air in furnaces shown in Fig. 1

Heating and HEAT TREATMENT of ORDNANCE

Section III—Cartridge and Shell Cases

■ THE MANUFACTURE of cartridge cases begins with a blank disk cut from an annealed strip of metal commonly known as cartridge brass, containing 70 per cent copper and 30 per cent zinc. However, this composition may vary within certain limits to obtain special properties.

The first operation is cupping, which is followed by two, three or four draws, depending on the size of the case. Following the drawing operations come trimming, heading, tapering and machining of the head in just the order named.

After the cupping operation and each draw, except the last one, the cases are annealed at a temperature of 1100 to 1200 degrees Fahr. Coming from the last draw, the mouth end of the case is annealed at a temperature of 935 degrees Fahr. for tapering. After tapering, the case is given a final mouth anneal at 960 degrees Fahr., which

By E. W. WEAVER
Assistant Chief Engineer
Surface Combustion Corp.
Toledo, O.

is followed by a stress-relief anneal at 500 degrees Fahr. These temperatures are approximate only and may vary somewhat in different plants.

Cupping and Draw Anneals: For the cupping and draw anneals at 1100 degrees Fahr., both batch and continuous furnaces are used. Convection-type furnaces are by far most popular for this operation. Experience has shown that for temperatures up to 1250 degrees Fahr. and even higher, the forced-convection type furnace will give a higher degree of uniformity and a faster rate of heating than other types of furnaces.

These furnaces may be either of the batch or continuous type. The batch furnace may be either of the vertical or horizontal type. Fig. 1 shows three of these furnaces installed for this operation. Fig. 2 is a schematic drawing of such a furnace. Fig. 3 shows a horizontal batch-type convection furnace also being used for annealing cartridge cases.

Continuous forced convection furnaces may be equipped with any type of conveyor. Perhaps the most common are the chain, the roller hearth, and the pusher type conveyor in the order named. Fig. 4 shows a continuous convection-type chain-conveyor furnace with the quench, pickling and wash tanks at the right.

Fig. 5 shows another method of handling cases in continuous furnace. However, we understand that the cases are now being handled in baskets in this furnace. The advantage of handling the cases in baskets will be described later.

Taper Anneal: After the final

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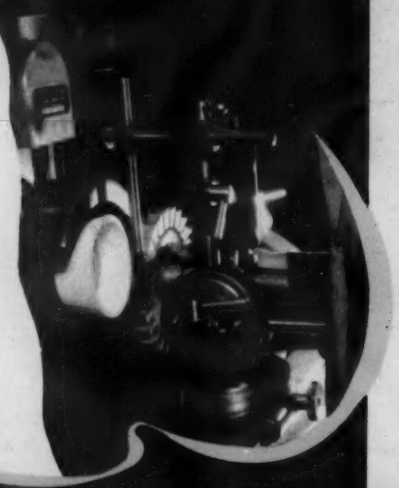

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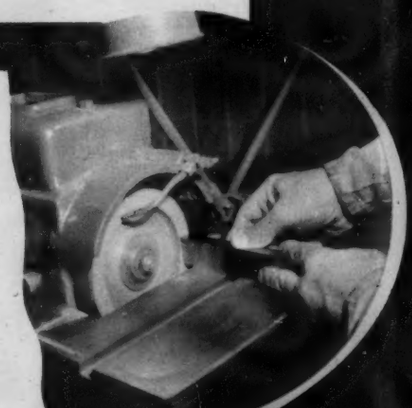

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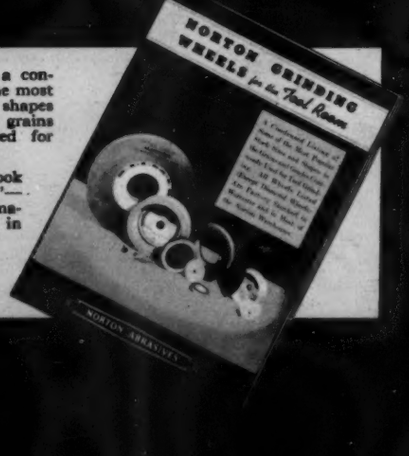


NORTON ABRASIVES

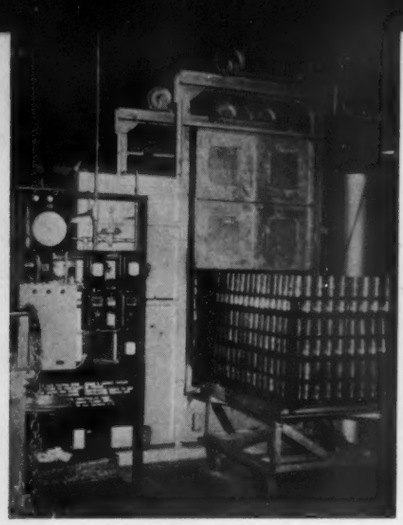


Fig. 3. (Left)—Horizontal bath type forced convection furnace for cup, draw and relief annealing. Roller hearth and baskets facilitate handling of shell cases

Fig. 4. (Right)—Continuous forced-convection chain-conveyor furnace for draw annealing of shell cases. Same type of unit also suitable for cup and relief annealing. Note overhead monorail conveyor system for handling work in baskets as well as quench, pickle and wash tanks at right, also under the conveyor line

draw, the cases are usually trimmed, headed, and then annealed at 935 degrees Fahr. or thereabouts for tapering. This is usually followed by a final mouth anneal at a slightly higher temperature. For these two anneals, the salt pot furnace is commonly used. The case is placed only part way in the molten salt in order that only the mouth end of the case be softened, without disturbing the hardness and other physical properties of the head or remainder of the case.

Continuous Operation Feasible

Salt pot furnaces for this purpose can be adapted for continuous operation by use of an overhead conveyor. For such work the conveyor can be arranged to drop and lower the cases the desired depth into the salt; then rise, remove the shells from the salt and lower them into the quench. This same procedure is then repeated for the pickle and wash without removing the work from the conveyor, thus facilitating high production speeds and continuous movement of work through the processing operations.

Perhaps a simpler method incorporating the continuous feature is the installation shown in Fig. 6. This consists of a series of pots, one for the salt furnace. one for the quench, another for the pickle and a fourth for the wash. These are arranged in a circle with an overhead mast-type mechanism for handling the cases in a suitable container. In place of the mast-type mechanism, a simple overhead monorail and hoist can be attached similar to that shown in Fig. 4. In this setup, loading and unloading stations are often incorporated. Depending on the method of handling, either round or rectangular pots and tanks may be used.

Relief Anneal: After the last mouth anneal, the cases are given a final stress relief anneal at 500 degrees Fahr. The purpose of this anneal is to prevent season cracks during storage. The temperature is not sufficient to affect the hardness or grain structure of the metal but does thoroughly relieve all residual manufacturing strains.

The furnaces used for this anneal are similar to those used for the "after draw" anneals. At this low temperature, the advantages of the forced-convection heated furnaces are even more pronounced.

Method of Handling Cases: When annealing the larger shell cases between draws, the cases are commonly handled in baskets in both continuous and batch furnaces. The cases are readily stacked in the baskets, by hand, in such a way that the cases are annealed, quenched, pickled and washed all in the same basket and without removing cases.

For small cases it is not economical to arrange them individually by hand in the container. Hence they are usually tumbled in the pickle and subsequent washing operation to insure that all of the liquid is spilled out of each individual piece. With the larger pieces which are arranged by hand, this same result is obtained by loading the shell vertically, or by merely tilting the basket if they are arranged horizontally. Hence no transfer and tumbling are necessary.

Fig. 5. (Left)—Another type of continuous-conveyor forced-convection furnace: The use of V-flights necessitates operators to feed and unload conveyor continuously. Often it is more desirable to handle the cases in baskets to avoid this continuous attendance. Fig. 6. (Right)—Salt bath furnace, quench, pickle and wash tanks for taper annealing shell cases arranged in a circle with a mast-type for transferring work through the various equipments in succession. A load-unload station may be utilized to facilitate the operations

How To Get the Most From

ARC WELDING

—Section VII—

By E. W. P. SMITH
Consulting Engineer
The Lincoln Electric Co.
Cleveland

. . . . . as Mr. Smith shows, laying out the correct sequence of operations in fabricating any weldment largely determines the speed and efficiency with which the actual production work will be done

■ ALL OF the factors previously reviewed in this series are more or less mechanical in as much as they relate to the actual fabrication of the product. However, the arrangement of these factors and their effect upon subassemblies and assemblies gives rise to another factor that is extremely important in any study of how to increase the speed of production. This factor is the *sequence of the operations.*

Laying out a job for welding is a matter of studying the parts, subassemblies and assemblies to determine whether better control and higher speed will result if the final product is broken down into a number of subassemblies, and whether the final assembly should be made by a large crew working in a definite sequence. In other words, is a parallel operation desirable in all cases, or should some parallel series operations be utilized?

It, therefore, may be helpful to study the sketch, Fig. 1, to obtain some idea of how such a sequence may be worked out. In doing this, consideration should be given to the various parts, the subassemblies themselves and the final assemblies so that complete and adequate control of the work may be had—in other words, so that the men are not standing on each other's toes. Interferences of one man with another may occur, and elimination of interference in conjunction with proper assembly sequence is productive of high speed.

An excellent example of this is the case of fabricating frames for busses. These are essentially flat bases, relatively shallow, with rather large dimensions, and consequently afford an opportunity for a great number of men to work on the particular part at one time. However, subassemblies were worked out so that the men working on the final assembly of these into the complete base were not in each other's way.

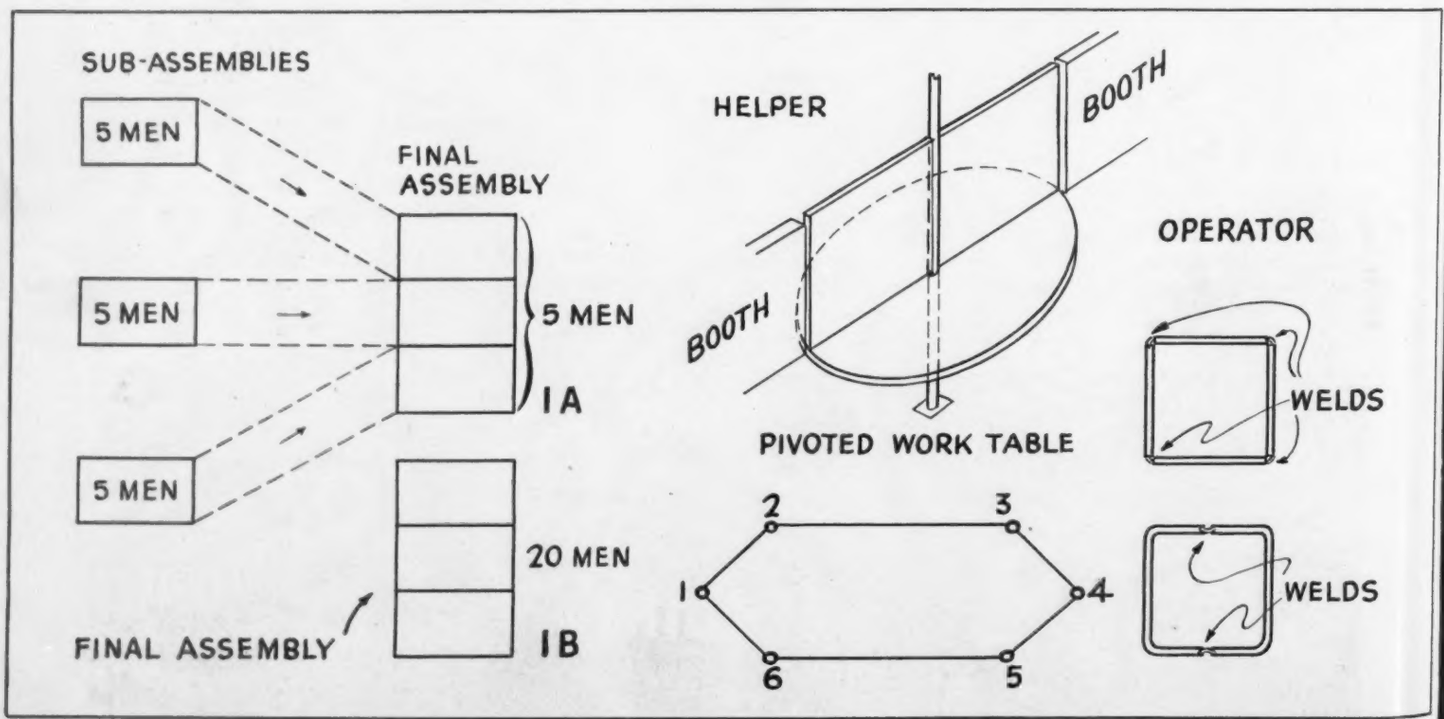
For example, refer to Fig. 2. If welds 1 and 4 could be made in such a way that they would come to the final assembly completed, then on the final assembly

Fig. 1. (View at Left)—In setting up the sequence of operations it is important to be sure the interference of one worker with others is prevented. Splitting the job up into subassembly operations often is the best way to prevent interference. Thus where interference might occur at 1B, it would not at 1A

Fig. 2. (Center View, Bottom)—Making welds 1 and 4 before welds 2, 6, 3, and 5 avoids interference

Fig. 3. (Center View, Top)—A rotating jig setup often can be used to advantage, the helper setting up the parts to be welded in the jig while the operator is welding a second part. Upon completion of the welding, operator revolves table to bring fresh work to hand which he welds while helper removes completed part and reloads jig

Fig. 4. (View, Extreme Right)—Four corner welds, upper, can be reduced to two butt welds, lower, by use of bending—so this possibility must be considered in laying out the sequence of the welding operations



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Now that I've licked the lever problem, do you suppose I might flop if I tried welded steel for the frame?

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That's right! A non-believer-in-welding might say I flopped when the first try on those levers didn't produce a big saving.

ALTER EGO: There you are! And because of your firm *belief in welding* you kept trying until you got the right answer.

And those three trys gave me a 50% saving. That's worth the effort any day.

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welds 2, 6, 3 and 5 could be made with the men working on opposite sides of the part. This in effect is what was done in the case of bus frames.

Another important factor in getting speed through proper sequence of operations is the right division of work between welder and helper. One layout that works well is shown in Fig. 3. Here the operator is welding the part previously set up. Then the welder rotates the work table to bring another set of parts into position which he then welds while the helper dismantles the welded parts and sets up new work. This, of course, is an extremely simple method but one used in a number of automobile plants. It can be applied to a wide range of work up to some relatively heavy parts.

Another method similar to this is to have the work delivered to the operator's station by industrial power trucks. The operator welds the parts and then drops them underneath his bench where they hit a slide that carries them into the out, or collecting, receptacle for the truckers to take away.

In other cases, use is made of a conveyor which passes in front of the operator at a rate which coincides with the linear rate at which the welders are able to deposit the metal. The operator stands in front of the work and welds as it moves past him. This is an automatic, or semiautomatic, handling arrangement to get a continuous flow of work. Of course it is most suitable for welding various structural sections or other work involving welds of some length.

The idea back of all of these methods is essentially the same—that is, for the helper to set up, the operator to weld, and then the helper to dismantle. Or the work may come to the welder who does the welding job, after which it passes from him on to some other operation—whether that be dismantling from a jig or fixture, or whether it be some further welding or fabricating operation.

Work might pass in front of an operator on a conveyor which may be of any type. These conveyors would work at a set speed so that the operator would not have to move to any great extent. An example of this would be automobile frames which pass by an operator for certain operations. This conveyor may consist of any general type, including rolling belt, overhead chain, etc.

In some cases, the welding fixture is loaded, placed on the conveyor and passed on to the operator. Then the welded unit leaves the operator and passes down the conveyor to be dismantled or passed on to other operators.

Right here is another item for consideration—should the operator confine his operation to just one type of weld, or one portion of the welded fabrication, or should the welding of the particular fabrication be split up among several operators? This question is not easy to answer, but there are certain fundamental considerations which, if kept in mind, will prove helpful in a great many cases.

For example, in case of automobile frames, where certain lap joints are made, it takes a man particularly skilled along these lines to make these joints. He makes the joints and the part then passes from him to another operator who makes another type of joint. Eventually, the work is lifted up into another type of conveyor, the function of which is to position the work so that the operator may weld down in what might be termed the front end, or nose, of this particular fabricated frame.

There is also another important question—should a joint be welded and then bent or should it first be bent and then welded?

For example, assume that there are two steels to be welded together—one high in carbon, the other a lower carbon type. They may be welded together, heated, bent and then heat treated. This procedure saves time and expense of one heating operation as compared to heating for bending, bending, welding and heat treatment, and it is a better job. The reason for the first heat operation is the use of the high-carbon steel.

The particular instance in mind involves the placing of a high-carbon edge with a strap on another lower carbon, and then forming these to a shape which was rather complicated. Inasmuch as the high-carbon material had to be heat treated, and since it could be welded in the straight, then

(*Please turn to Page* 151)

How To Remove Streetcar Rails Economically

■ In view of recent actions by various municipalities to take up abandoned streetcar tracks to aid the nation's scrap situation, The Linde Air Products Co., 30 East Forty-second street, New York, offers a development which allows economical removal of these rails with a minimum of repaving.

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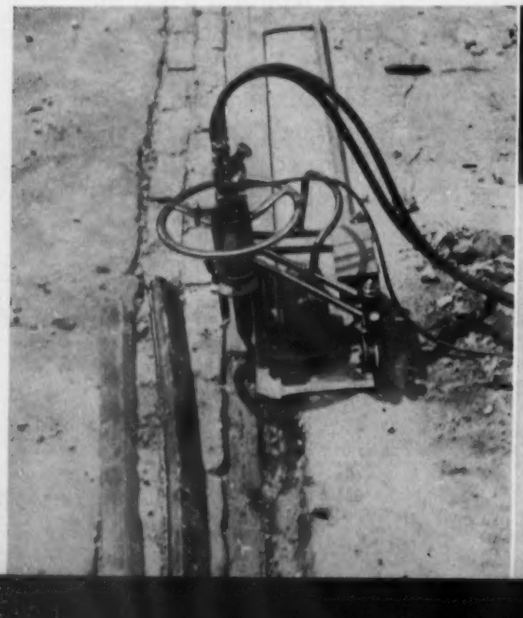
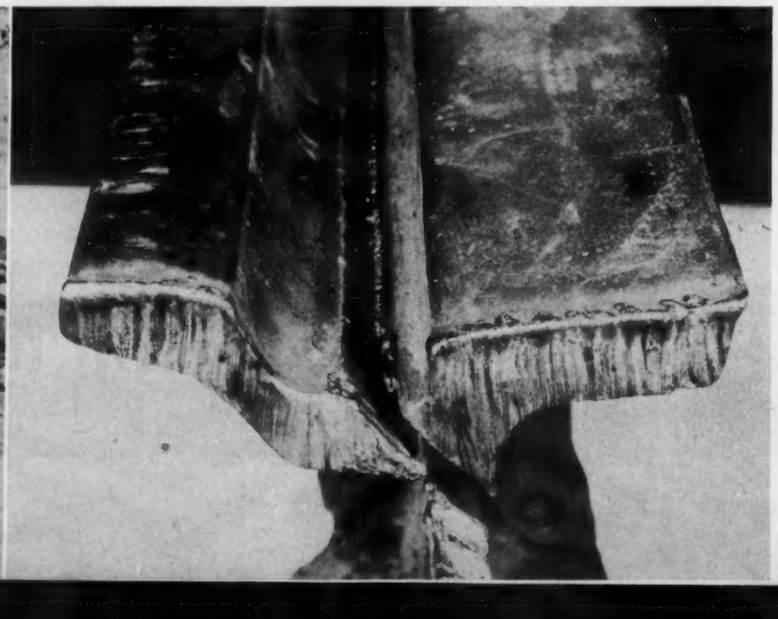
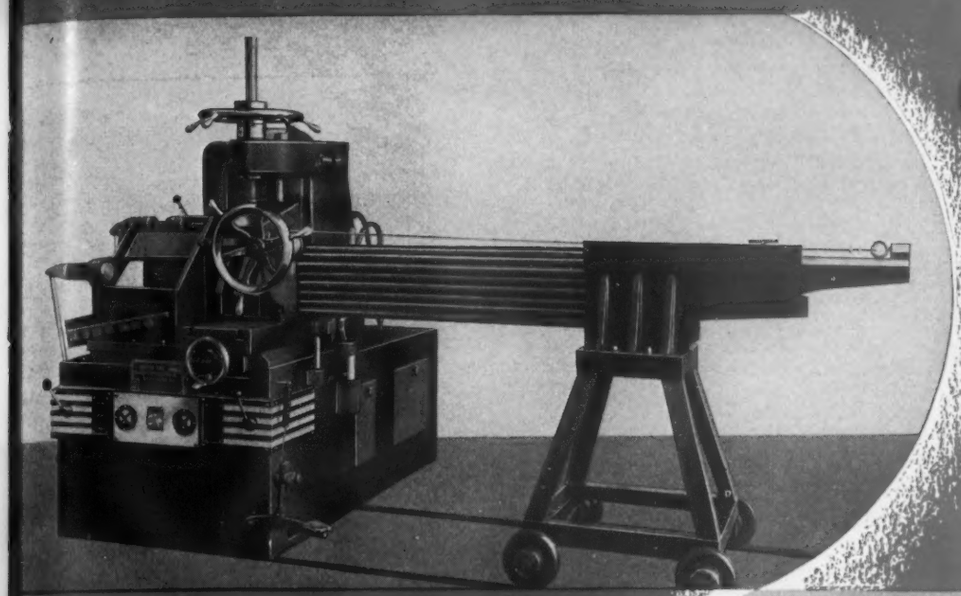
The cutting machine, positioned on a special track as shown in the illustration at left, makes a single cut at an angle, as shown in the photo at right, along the groove of the rail so that the top of the rail is severed from the web in two longitudinal sections. The cut rail is then removed with a pinch bar.





The MOTCH & MERRYWEATHER *Cold Sawing* COMBINATION



Booth 41
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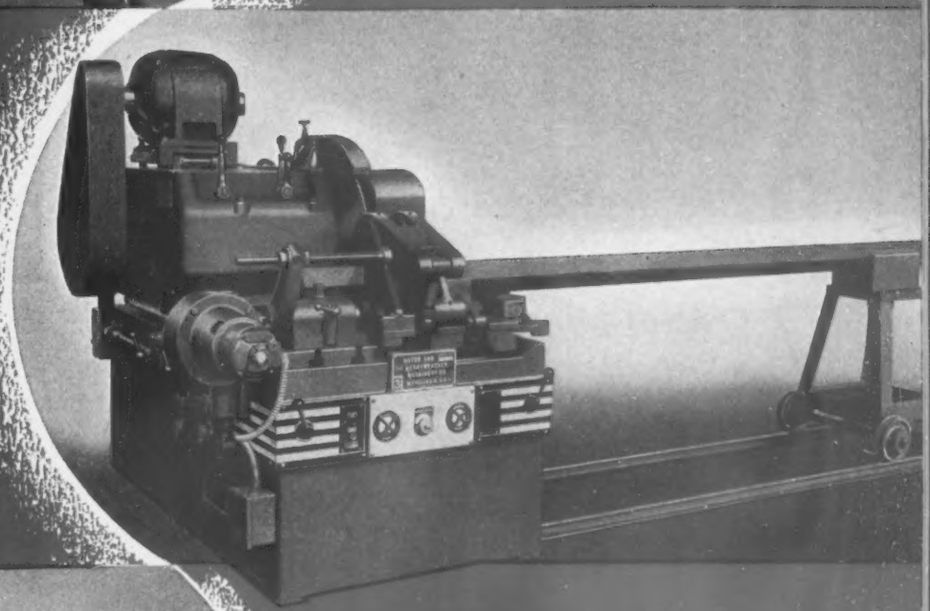
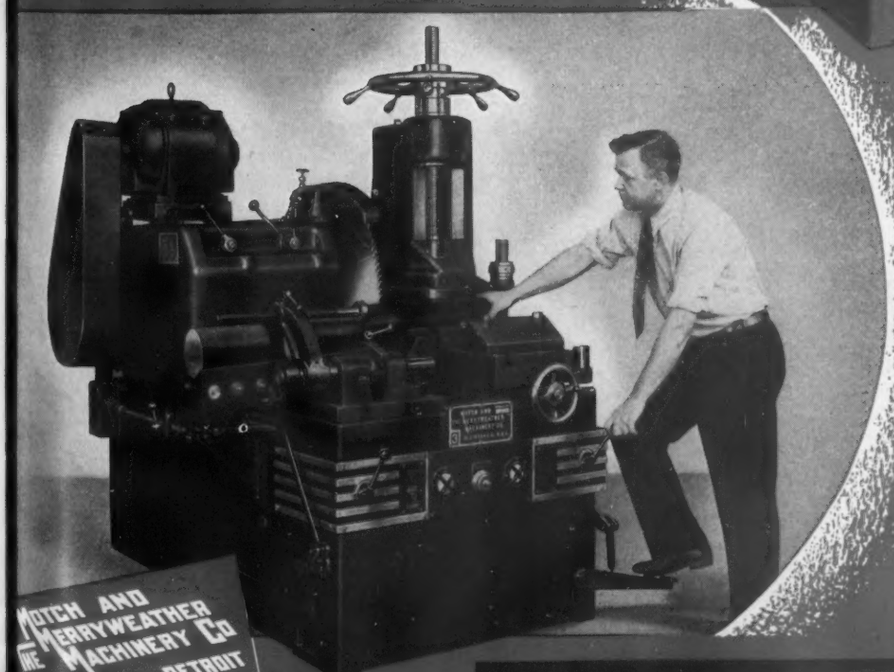
Investigate the method perfected by Motch for holding an unlimited number of stock rigidly and cutting them simultaneously. The savings are tremendous. (Power-fed type.)

The "No. 3 Special." Note the attachment at the right, which enables the operator to take a sample cut from each end for etching or other purpose, as well as to cut the entire bar of metal into shell slugs or other pieces . . . (Power-fed type.)

Illustrated below is the No. 3 M. & M. Cold Sawing Machine equipped with roller conveyor and stock stop operated by foot treadle. (Hand-fed type.)





The Motch & Merryweather Cold Sawing Combination (Cold Saw, Saw Blades and Saw Grinder) is being bought over and over again by the same purchaser. The principal reasons are: speed, squareness of cut and absence of burrs, no waste of material, long-lived blades and fast, accurate sharpening. Two sizes of machine cut up to 15" round and 13½" square stock. See our demonstration at Philadelphia.

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Penton Building • • Cleveland, Ohio

MOTCH AND MERRYWEATHER MACHINERY CO
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Built by **MOTCH & MERRYWEATHER**

Accuracy... Fine Finish...

REMOVING 35 CU. INCHES OF
S.A.E. 1045 STEEL PER MINUTE

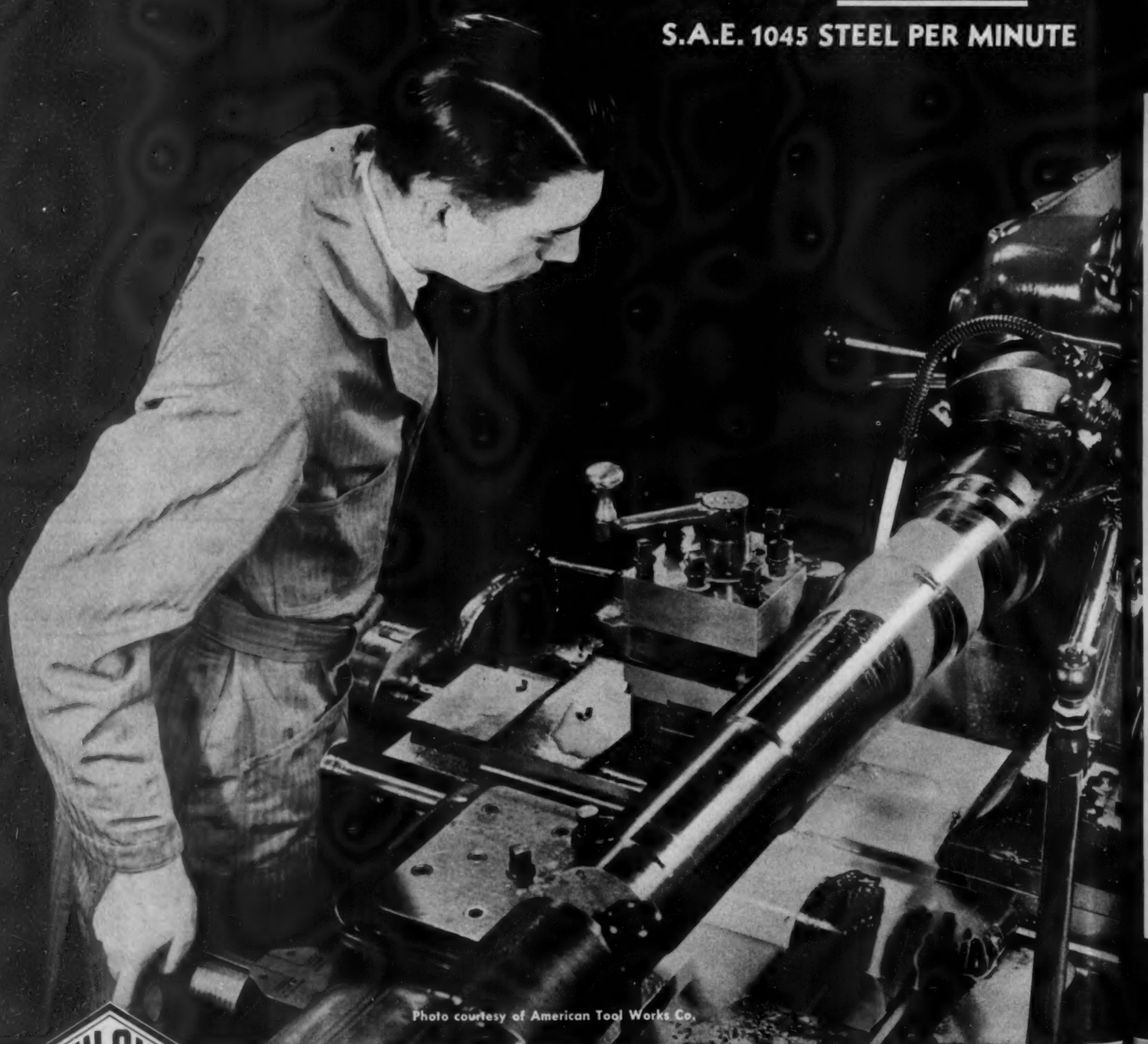

Photo courtesy of American Tool Works Co.

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SKILLED MECHANICS appreciate the long, trouble-free runs between tool grinds that are possible with SUNOCO.

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OPERATION: Turning and drilling roller bearing.
MACHINE: Warner & Swasey 4-A Universal Turret Lathe.
CUTTING SPEED: 60 s.f.p.m.
CUTTING LUBRICANT: 1 part Sunoco to 20 parts water.

OPERATION: Milling main connecting rod.
MACHINE: Cincinnati 5-60 Duplex Hydromatic Milling.
STOCK REMOVAL: Rough ¼ inch, finish .020 inch.
CUTTING LUBRICANT: 1 part Sunoco to 30 parts water.

OPERATION: Plunge cutting whorl 3" x 1¼".
MACHINE: No. 2 Cincinnati Centerless Grinder.
MATERIAL: Cast iron. LIMITS: Plus or minus .001 inch.
COOLANT: 1 part Sunoco to 30 parts water.

FOR ALL INDUSTRIES

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Advanced Techniques of Adapting

METAL POWDER to INDUSTRIAL USE

Presented at Powder Metallurgy Conference at M.I.T.

"Corrosion" process of making 18-8 stainless steel demonstrated at second annual meeting

■ WITH approximately 150 in attendance, the second annual Powder Metallurgy Conference, held at Massachusetts Institute of Technology, Cambridge, Mass., Sept. 25 and 26, under direction of Prof. John Wulff, reflected notable advances in the technique of adapting various types of metal powder to efficient use in a wide range of industrial parts.

Thirteen papers in all were presented for discussion. Of particular interest at the ferrous session were samples of an 18-8 stainless steel powder shown by Professor Wulff and made by a "corrosion" process which he developed. The process is successful only on alloys which can be heat treated to make the grain boundaries much more corrosive than the grains; that is, the corrosion depends upon difference in potential between grain and grain boundary. At best, this is only slight, indicating that careful regulation of the process is essential.

Professor Wulff took pieces of thin-gage 18 8 chromium - nickel steel (not stabilized of course), heat treated them at about 1300 degrees Fahr., then dropped them into a solution of 3 per cent copper sulphate and 3 per cent sulphuric acid, continuously agitating the solution. As corrosion proceeds, powder is formed, most of it being single crystals of the steel, size being controlled by the grain size present before the corrosion.

Powders of other alloys, such as 42 per cent nickel-iron alloy can be produced similarly by this method which, while not yet in commercial use, would appear to have interesting possibilities, provided the proper control can be worked out.

F. V. Lenel of the Moraine Products Division of General Motors Corp., Dayton, O., discussed some experiments in steam treating iron powder compacts to obtain a skin of magnetic iron oxide on particles for corrosion protection. Powder used was a mixture of 98 per cent iron and 2 per cent graphite, the steam treatment being carried out at 1075 degrees Fahr. after test pieces had been compacted and sintered. Reaction with steam which is passed through the semiporous pieces comes to a stop in about one hour. In this time about one-fifth of the iron is changed to oxide. Appreciable increase in hardness is realized, yield strength is doubled, dimensional change is only slight, and resistance to corrosion is markedly superior.

The process is used commercially in parts which Moraine produces. One example is a blade guide for a metalcutting saw where the hardness of the guide gives much longer life. Another is in stove drawer rollers where both hardness and resistance to corrosion are advantageous. A third is in vanes for diesel fuel pumps where frictional properties of the steam treated material prove beneficial.

Interesting experiments of a preliminary nature in hot pressing iron powders were reported by R. P. Koehring, also of Moraine Products. Bars were pressed from four different types of powder and from scrap steel turnings, then heated to sintering temperature and immediately forged by being struck a single blow in a forging hammer. Test bars were machined from the forged samples and examined for physical properties. Determining factor on physicals was found to be the amount, character and distribution of oxide inclusions in the material. Hot pressing of powders and hot forging of sintered "preforms" naturally is productive of material which is closer to solid metal in characteristics than the cold pressed and sintered powders.

C. G. Goetzel, American Electro Metal Co., Yonkers, N. Y., reviewed some experimental work he had carried out on hot pressing of three types of iron powder—Swedish sponge iron, electrolytically reduced iron and hydrogen reduced iron—under varying conditions of heat and pressure. Two series of experiments were conducted, one in the low-temperature (500-800 degrees Cent.) high-pressure (2-50 tons per square inch) range, the other in the high-temperature (900-1200 degrees low-pressure (½-2½ tons) range. In the high-pressure work dies were of 18-4-1 tool steel, enclosed in a high-frequency furnace. Low-pressure dies were of graphite. Tabulation of pressure-temperature effects on different physical properties of the three powders provided comparison curves. These data were published in *The Iron Age* for Sept. 4.

Matter of Design Important

Some striking examples of small machine parts now produced from powder were discussed by R. P. Seelig, Powder Metallurgy Inc., Brooklyn, N. Y. Some of these had section thicknesses down to 0.030-inch and hole tolerances of the order of 0.0005-inch, raising fabricating difficulties in proper filling of dies, locating of cores, etc., which put engineers to a real test.

Dr. A. V. deForest, in commenting upon some of the intricate designs required by certain machine parts, speculated as to whether designers were fully apprised of the properties of compressed and sintered powders and suggested that many designs could be greatly simplified. He pointed out that the factor of ductility in a metal is used by designers as a sort of "safety valve" to absorb occasional overloads by plastic deformation, and to overcome effects of mechanical discontinuities. He suggested that if, as is the case with compacted powders, discontinuities are not present, it might be possible to forget ductility and design for a brittle material.

"Complexity of a part," he said, "is just a confession of poor design."

This matter of design is an important one in powder metallurgy, and several members of the conference audience commented on it. There seemed to be uniformity of opinion that engineers and designers must be educated in what metal powders can offer, and then originate new designs to make use of powders instead of merely adapting them as substitutes for solid cast, rolled or forged metals.

(*Please turn to Page* 153)

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A Porter Fireless does not require diesel, electric or other motors. There is nothing to make initial cost high.

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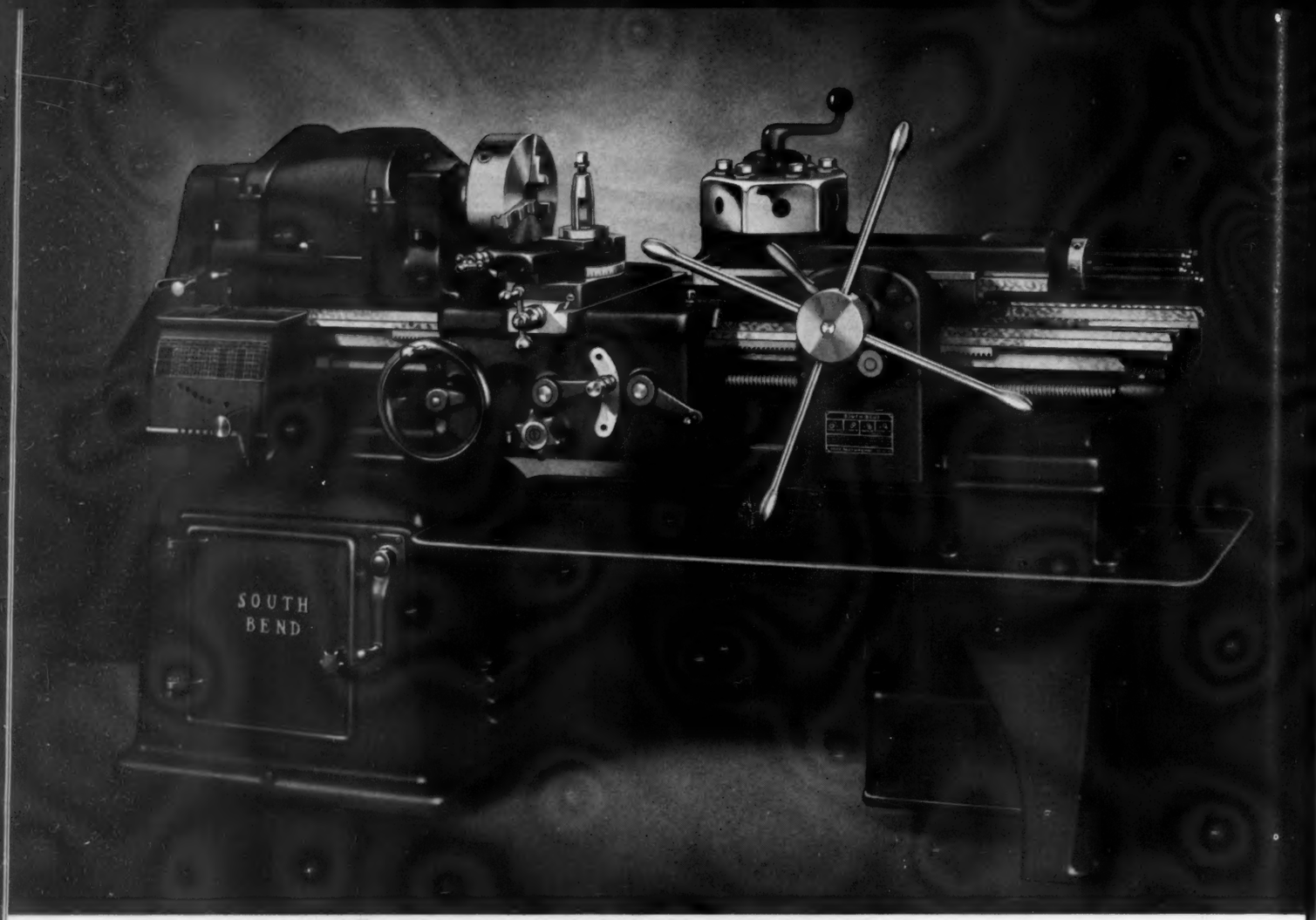

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THIS NEW South Bend 16″ Turret Lathe combines the precision and versatility of a toolroom lathe with the rapid production facilities of a turret lathe.

The power feed ram-type turret has six faces, with automatic indexing and individual stop for each face. The turret is mounted on the inside bed ways and may be clamped at any location the entire length of the bed.

The carriage has friction clutch drive for power cross feeds and power longitudinal feeds, also lead screw and split nut for cutting accurate screw threads. Mounted on the outer bed ways, the saddle wings clear the turret base to allow free movement of the carriage. Telescopic taper attachment, hand lever collet chuck and other attachments can be supplied.

The quick change gear box provides 48 changes for all carriage feeds and turret feeds. In addition, there is provision for changing the direction and speed of the turret feeds with relation to the carriage feeds.

The direct motor drive provides twelve spindle speeds ranging from 21 to 731 R. P. M. Headstock spindle has 1⅜″ capacity for bar stock. Rapid acting hand lever collet takes up to 1″ round stock.

In addition to this turret lathe we manufacture a complete line of back-geared screw cutting lathes, 9″ to 16″ swing, for toolroom and general shop use. Also 9″ and 10″ swing lathes with hand lever bed turret. Our factory is equipped to make prompt delivery on priority rated orders. Write for dealer's name.

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HANDLES 400 SHELL PER HOUR

. . . . through efficient welding aids. Attaching disks to shell bases to form a gas tight seal is speeded by built-in handling facilities

■ ONE OF THE essential safety features of practically all modern shell is a disk that is welded to the bottom of the shell body. The purpose of this disk is to guard against the possibility of the bursting charge in the shell body being set off inadvertently by the propelling powder charge as the gun is fired. There is a possibility of this happening if there is a slightest fissure, seam or crack in the base of the shell body.

While it is true that perhaps only one shell in a million with such a fissure would get by the many careful inspections, it is highly important that even this slight possibility be eliminated. For if there is the slightest crack in the base of the shell, flame from the explosion propelling the shell body from the gun can be conducted to the explosive charge in the shell, causing the shell to explode in the gun. Of course this would not only wreck the gun and throw the gun crew out of action but also would do serious damage to surrounding units as well.

Of course, all forgings for shell are carefully inspected at each step of their manufacture to see that no cracks or fissures develop. It is to check against cracks that some manufacturers nick and break the billets prior to forging as this affords an excellent opportunity to examine the cross-sectional structure of the billet. After forging and during machining, the base of the shell is carefully inspected at a number of places on the production line.

Yet to make doubly sure that there is no possibility of the shell exploding in the gun, a second seal is provided by welding a disk of bright annealed steel to the base of the shell body. This disk is circular and of a diameter slightly smaller than the base of the shell.

A recently developed unit for welding the disk to the base of the shell is shown in the accompanying illustrations. It is built by Thomson-Gibb Electric Welding Co., Lynn, Mass. One of the prerequisites of shell production is high rate of output, many production lines being geared up to produce 300 to 400 shell per 8-hour shift, it is essential that every facility be provided to get the work to, into and away from the machine as fast as possible and with minimum effort.

As in any high-speed production line, the materials handling methods may determine whether or not a bottleneck is to exist at the machine. A setup which works well is shown in the accompanying illustrations. The shell bodies are delivered to the machine on a gravity feed type roller conveyor and are conducted away from the machine on a similiar conveyor placed alongside the opposite side of the welder. Or if the production system indicates or the location of other machines makes it desirable, it is possible to utilize the two roller conveyors to carry work to the welder, the assembled shell bodies then being loaded on racks and carried away from the welder in batches.

The tandem seam welder shown here can assemble up to 400 shell bodies per hour. The welder is standard in many respects. The welding transformer is housed in the body of the welder. The transformer secondary is connected to two wheel type electrodes. In making welds the shell body is placed upside down in a fixture, and the two electrode disks moved downward to contact the work. Welding current flows from one wheel electrode down through the sealing disk to the base of the shell, into the shell body itself and back up through the sealing disk into the second wheel electrode, completing the circuit. Current is not applied continually but in short pulses making a series of overlapping spot welds as the work revolves under the wheel electrodes.

The machine shown is used in the production of 75-millimeter and 3-inch anti-aircraft shell but can be adopted quickly to a wide range of other sizes since the spacing between the wheel electrode can be changed to accommodate different shell base diameters. Of course the fixtures also would need to be modified to accommodate other sizes.

Specifications call for attaching 0.031-inch thick circular disks of bright soft annealed steel to the

Fig. 1—Here can be seen the sliding fixture which allows almost continuous operation of the welding machine which goes through its cycle of operations automatically, once they are initiated by the operator. Note handy placement of roller conveyors

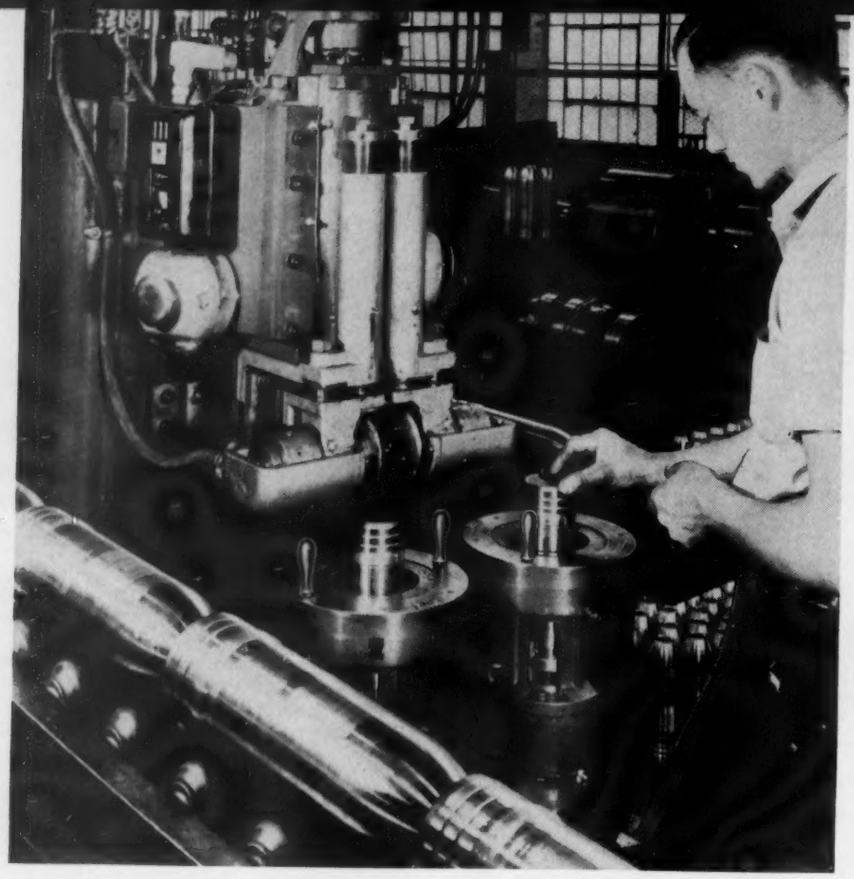

Fig. 2—After shell is inserted nose down in fixture, the sealing disk is centered on the base, the electrodes lowered by a foot switch and the welding cycle initiated by pushing a button. Illustrations supplied by Thomson-Gibb Electric Welding Co., Lynn, Mass.

base of the shell bodies. For 3-inch anti-aircraft shell, the sealing disks are 2.50 inches in diameter. For 75-millimeter shell, the disks are 2.26-inch diameter. The welds are required to be gas tight. Unless they are, the disk will not serve its purpose in sealing off the base of the shell.

Part of the secret of the success of this high production unit is the ingenious two-station sliding fixture which makes it possible to keep the machine in almost continuous operation. It also relieves the attendant of practically all responsibility for accurately locating and aligning the work. Each of the two stations consists of a quick-acting hand-operated chuck designed to grip the body of the shell. In each station is a spring-backed cup located at the bottom of the chuck for the purpose of centering the shell on its nose end. For larger shell where the weight of shell and fixtures makes hand shifting difficult, the fixture is slid from one station to the other by means of a pneumatic powered cylinder and piston.

To make welds, the operator puts a shell in each chuck, places a disk in position on the base of each shell, and then brings the welding wheels into welding position over one of the stations by stepping on a foot valve which causes the overhead air cylinder to lower the wheel electrodes onto the work. The operator then starts the shell rotating by pressing a button. Welding current is applied automatically and is cut off as soon as the shell turns 180 degrees. Complete rotation is not necessary since two seam welds are made simultaneously on the work, thus 180 degrees rotation of the shell produces a complete seam around the entire circumference of the disk. Rotation of the shell also stops automatically.

As soon as the first weld is complete, the operator shifts the fixture carrying the two shell bodies by working the hand lever shown at the lower center in Fig. 1. Then he starts the welding operation on the second shell. While that shell is being welded, the first station is unloaded and reloaded. Subsequently, the procedure is repeated continuously with remarkable efficiency.

Handling the entire job with one operator results in a production time study indicated below. It is based on welding disks to 75-millimeter shell bodies at an average welding speed of 5½ to 6 feet per minute. Larger disks or slower welding speeds of course would change the time required for the welding.

With One Operator: While shell is rotating (3 seconds), load and unload shell at other station, total 6.0 seconds; lift the head, 1.0 second; shift fixture, 1.5 seconds; place disks, 2.0 seconds; lower head and start rotation, 1.5 seconds; total time 12.0 seconds. This figures out to be a production of 300 shell per hour at 100 per cent efficiency or 240 shell per hour at 80 per cent efficiency—the usual method of figuring output for an operation of this type.

With Two Operators: One operator works the loading station, loading and unloading shell and requiring 6 seconds for this work. Second operator runs the welding station. His time breaks down to 2 seconds to place the disk, 1.5 seconds to lower the head and start rotation, 3 seconds to complete the weld, 1 second to lift the head. This makes a total of 7.5 seconds for his operations to which must be added the time to shift the fixture from one station to another which requires 1.5 seconds making a total of 9.0 seconds for the entire series of operations. Of course, while operator No. 2 is performing his work which requires 9 seconds operator No. 1 at the loading station is idle three seconds since his operations only require 6 seconds. The resulting production rate, however, is 400 shell per hour at 100 per cent efficiency or 320 shell per hour at 80 per cent efficiency.

Gadget Reduces Handling

A gadget which helps materially to cut down handling time and to maintain accuracy in high speed work is a device for locating the sealing disk on the shell base. It is mounted on a bracket and extends out and just below the two welding wheels. Raising a handle on this device brings two pins into contact with the shell base and provides a pair of stops against which the disk can be quickly and accurately located. Releasing the handle allows the device to drop out of the way automatically.

The tandem seam welder is driven through a variable speed drive which provides infinite welding wheel speed variations within a range of 2 to 6 feet per minute. The machine is powered by a 40-kilovolt_ampere Thomson tubular secondary transformer which employs heavy nonclogging copper tubes in the secondary circuits. There are 16 points of regulation. The driving power is supplied by 1½-horsepower motor at 1200 revolutions per minute.

The two welding electrode wheels are mounted on long vertical slides and are backed up by adjustable pressure springs. The ram supporting the slides is raised and lowered by a 4-inch bore adjustable stroke inner cylinder. The welding wheels are also adjustable to and away from each other which permits welding various size shell.

Efficient water cooling is obtained by means of hollow water cooling shafts for the welding wheels and by encasing the welding wheel bearings in water troughs. Each electrode wheel is connected to one secondary terminal of the transformer so welding current passes from one

(*Please turn to Page* 153)

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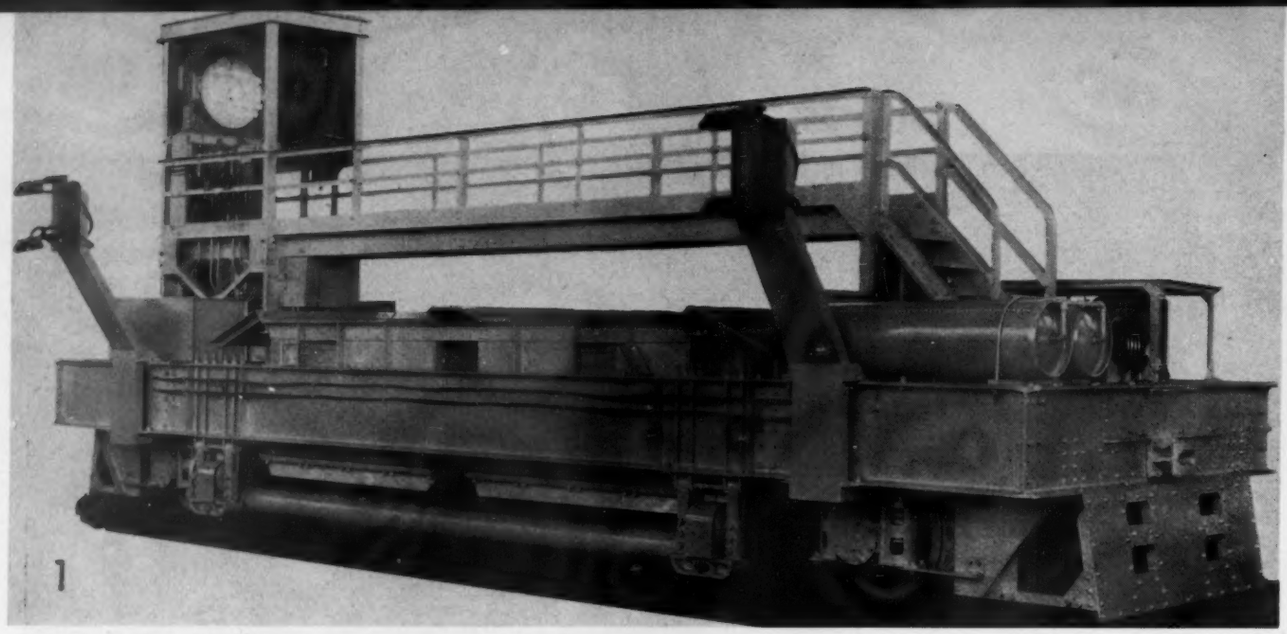

Fig. 1—Double hopper, 4-wheel scalecar of the bottom dump type

SCALE CARS

for blast furnace stockhouse service

By E. W. SCHELLENTRAGER
Vice President
Atlas Car & Mfg. Co.
Cleveland

■ MODERN SCALE cars are of the double-hopper bottom-dump type, electrically operated, with heavy-duty weighing scales especially designed for this particular service, and with a scale dial of rugged construction, usually provided with an electrically-operated recording attachment. Fig. 1 shows a typical example.

Where heavy rails are laid in the stockhouse and are well supported, it is customary to use a 4-wheel car having each axle driven by an independent motor, particularly when the car is not required to pass around sharp curves at the repair track. However, in many cases, because of the necessity of passing around curves, or to reduce the load on the rails and wheels, 8-wheel cars, with two 4-wheel swivel trucks, are used. In such cases the modern cars have a one-piece cast steel sideframe truck, with selfaligning journal boxes and with motor supports cast integral. Such trucks have the advantage of reducing component parts and unnecessary joints, and are lighter and more satisfactory in service than built-up trucks. A typical example of an 8-wheel car is shown in Fig. 2.

In most modern plants the scale car operator also has charge of the sequencing system, which controls the charging of the furnace automatically. The coke is automatically fed and weighed in scale hoppers, which are equipped with an electrically-operated dial scale mechanism of the same rugged design as used on the scale cars. In order to acomplish the charging automatically, and to prevent accidents and incorrect operation, scale cars in such plants are equipped with a number of interlocking features. For instance, their discharge gates are interlocked with the skip hoist control, so that they cannot be opened to discharge the load unless the skip bucket is in position to receive it. This is important on double hopper cars, which are designed so that either hopper can be discharged without moving the car and, where a mistake on the part of the operator would lead to delays.

Another feature which is becoming increasingly popular of late is an arrangement for automatically recording the weight in the scale car hopper just before the load is discharged. This produces a check weight, which can be compared with the weight actually recorded by the operator when he charges the car. This automatic record is made without his knowledge and, therefore, is helpful in scale car operation.

The modern scale car is usually equipped with pneumatically-operated discharge gates and with straight air brakes. On many of the newest designs an interlock is provided to prevent operation of the car unless sufficient air pressure is available to insure emergency operation of the air brakes. This is a safety feature to insure sufficient braking power to stop the car, in the event of power failure. Ordinary service stops are

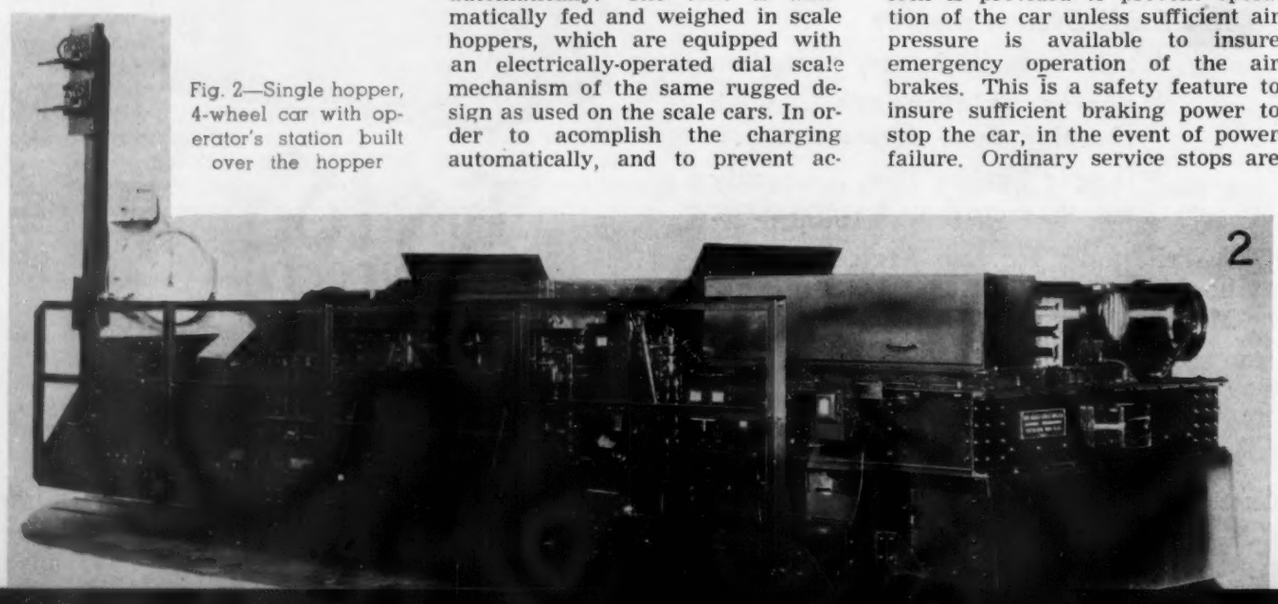

Fig. 2—Single hopper, 4-wheel car with operator's station built over the hopper

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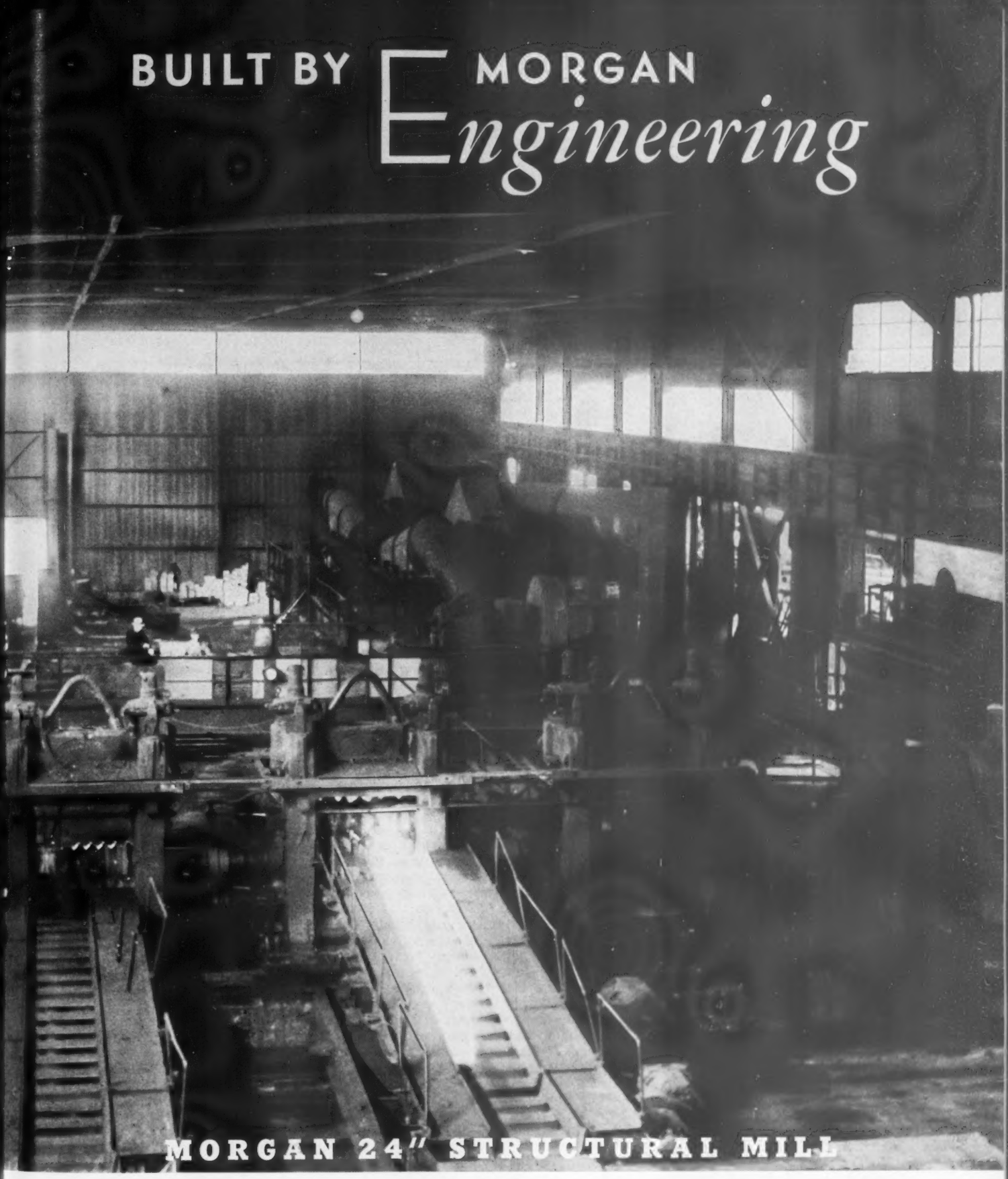

MORGAN 24" STRUCTURAL MILL

● Among the many types of mill equipment built by Morgan is the above 24" structural mill, consisting of three three-high stands served on each side by two traveling tilting tables and tail tables with transfers.

A two-high finishing mill located about 170'-0" beyond was also furnished. In addition, all necessary auxiliary equipment to handle billets and rolled shapes to the finished product was furnished with this installation.

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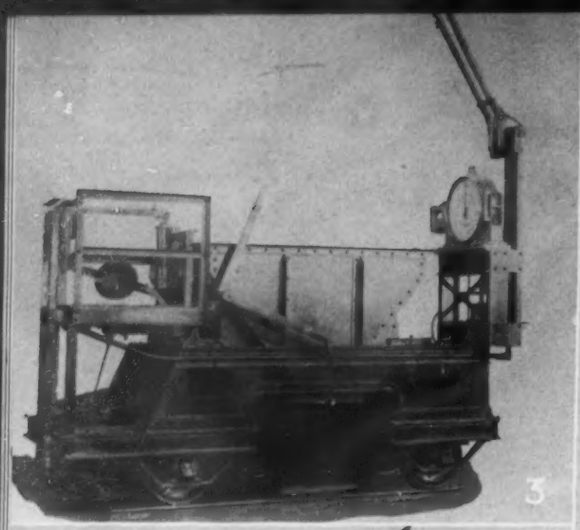
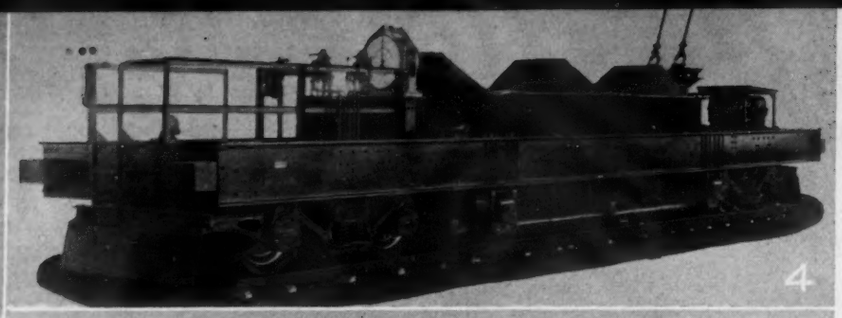
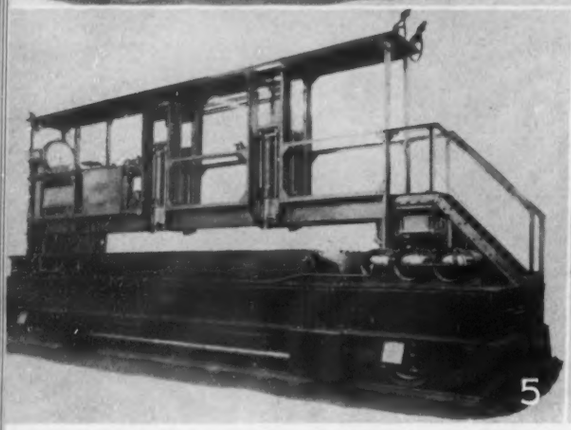






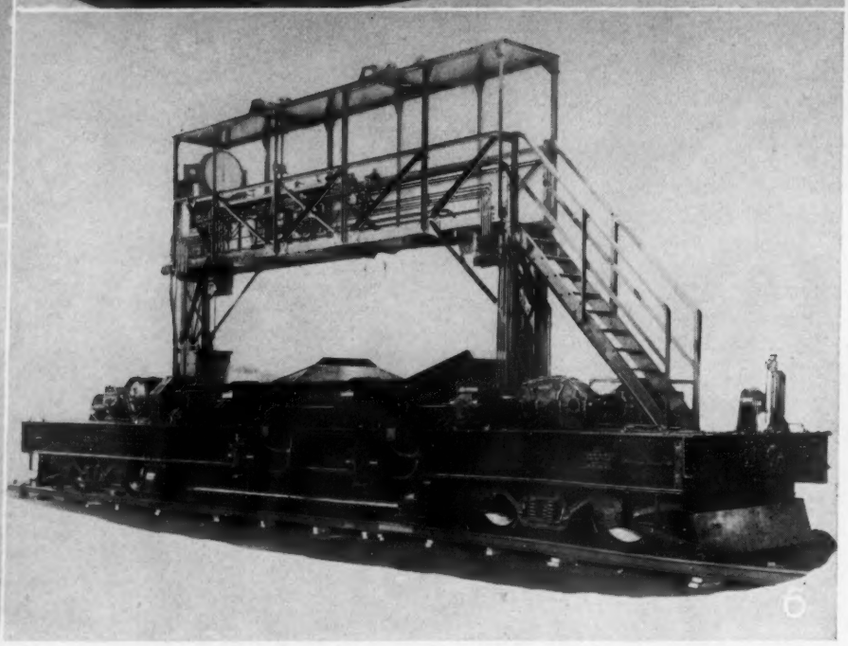


Fig. 4—Two 4-wheel trucks are employed where heavy rails are provided and sharp curves encountered. Fig. 3—Single hopper car with hand-operated discharge gate which is effective where travel distances are short. Fig. 6—Typical 8-wheel car equipped with motor-operated roller bin gate operating mechanism. Fig. 5—Air jacks or pneumatic operated cylinders are used on this type car for actuating bin gates

usually made by automatic plugging control equipment assisted usually by the air brakes.

While air-operated discharge gates are usual, there are prejudices against the application of compressed air in certain plants. Such prejudices usually can be traced to inefficient air cleaning equipment for the motor-driven air compressors of the scale car, or to indifferent maintenance of the air cleaners. This has been obviated largely by the use of modern oil bath air cleaners on most modern cars. For those plants where pneumatic operation is not desired, a hydraulic operating mechanism is available.

The hydraulic operation of discharge gates and brakes has the advantage that the oil for this purpose is in a closed system, and cannot readily be contaminated by dirt and dust. On this type of car it is possible to provide, in most cases, emergency equipment, which will apply the brakes automatically in case of failure of the electric power, and which can also be applied when the operator leaves the car for any purpose.

Various side discharge cars are in service and these differ but little from the type described, except in the arrangement of the hopper discharge gates. Fig. 3 shows a car of the single hopper type, with hand-operated discharge gates, which are counter-weighted to insure easy operation. In smaller plants single hopper cars often are used, while in some of the larger plants where the travel distances are short, high-capacity single hopper cars have proved effective.

Location of the operator's station on the car depends upon the type of stockhouse bins. In some cases his station is above the hoppers, whereas in many cases it is located along the side of the car. Such an arangement was followed in designing the large capacity single hopper 4-wheel car for a modern furnace, shown in Fig. 4.

The majority of stockhouse bins are hand-operated but many are arranged for mechanical operation. Modern design provides the actuating mechanism for the bin gates on the scale car, and a number of installations have been made for operating roller type gates directly from the scale car, in a satisfactory manner. By mounting the actuating mechanism on the scale car, a considerable reduction in power requirements and in maintenance cost is realized because there is only the single installation to maintain, and this is easily accessible and more perfectly controlled than the older form of roller bin gate installations. Fig. 6 shows a typical car with motor-operated roller bin gate operating mechanism mounted on the car.

Air jacks or special pneumatically-operated cylinders also are employed for actuating bin gates. This system involves gates somewhat similar to hand-operated units, but much larger in size, and using a double-lipped gate to prevent dribbling of the material from bins.

With this arrangement, or, in fact, with any of the modern arrangements where the bin gates are mechanically operated, the scale car weighman has little to do except to operate an air valve, or electric switch. Since manual toil is practically eliminated, the operator can concentrate on obtaining accurate weights. Fig. 5 is a typical example of a scale car equipped with air jacks for bin gate operation.

At present, a new design of scale car—the rotating bucket type—is in production. This type is used on furnaces where the skip buckets are carried on the scale car, and are hoisted bodily from the car and dumped into the furnace top. The new design now in production provides a car of extreme strength, fabricated largely by modern welding methods, and utilizing rolled steel shapes and plates almost exclusively, so as to produce the greatest possible

Advertisement OCTOBER, 1941

COPPER ALLOY BULLETIN

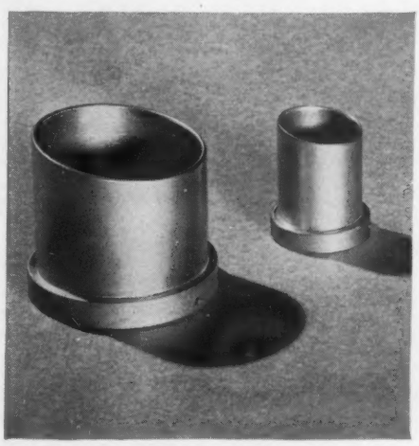
REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" *Headquarters for BRASS, BRONZE and COPPER*

Vital Airplane Lines Strengthened with Duronze III Fittings

To assure reliable support of the fuel and oil line tubing in modern airplane engines, special compression fittings are employed. The sleeves—essential parts of this type of fitting—are made of Bridgeport's strong, lightweight, corrosion-resistant Duronze* III alloy.

Duronze III is chosen for this and innumerable other military and civil applications because it is, indeed, an alloy of exceptional characteristics. It is 50% stronger and 9% lighter than ordinary brass. It is likewise highly corrosion-resistant to fuel, oils, exposure to the elements, sea water, dilute acids and other chemicals. These qualities provide unusual serviceability to parts made of this superior alloy. For full particulars on the properties and uses of Duronze III, write for Bridgeport's special Technical Bulletin on the subject.



These airplane engine tubing sleeves safeguard fuel and oil lines against the hazards of fatigue failure and vibration breakage. Bridgeport's strong, lightweight, corrosion-resistant Duronze III is fabricated with a diagonal end-opening to provide greater "spread" of support.

New Specifications Issued for Bronze

New and revised aeronautical material specifications have recently been issued for several types of copper alloys by the Society of Automotive Engineers. Among the materials covered are Light Annealed Brass Tubing, Naval Brass Rods and Bars, Brass Forgings, Phosphor Bronze Rods and Bars, and Aluminum Bronze. Copies of the new specifications are available from the S.A.E.

Lacquering of Copper Alloys and Copper is Often Useful Procedure

Different Methods Are Available Depending on the Service the Finished Articles Are to Perform and on Durability Needed

With the conservation of plating metals, such as nickel and chromium, becoming more and more of a defense necessity, it is of interest at this time to explore the possibilities of using lacquer finishes. Among the subjects that may now be reviewed profitably are properties of the available lacquer materials, the preparation of surfaces, and the methods of application.

The lacquering of copper, brass and bronze articles is not new. It has been employed successfully for many years to protect the finish and enhance the appearance of many types of products. Its possibilities are today greater than ever because manufacturers of lacquers have developed many new materials such as synthetic resins, gums, solvents and improved nitrocellulose, all of which have helped to improve the grade of available finishes.

Properties of Materials

It is now possible to obtain finishes that fulfill many specific requirements of copper and its alloys. Some of the characteristics demanded of these lacquers and reported to be available in certain formulations are: exceptional adhesion; resistance to sunlight, to high temperature (such as cigarette burns), to humidity, to abrasion, to handling, and to tarnishing; and also many other properties such as elasticity, flexibility, and immunity to checking.

Another valuable application of lacquer to brass, bronze or copper is for preservation of the pleasing effect and colors of articles that have sulphide or oxide coatings.

Methods of Application

All work for lacquering should be free of oil, grease and dirt. The cleaning procedure depends upon the condition of the surface, the material of which the article is made, the equipment available, and other factors. This subject was discussed in last month's issue of the COPPER ALLOY BULLETIN, copies of which are available upon request.

Lacquering processes include brushing, dipping and spraying—by gravity, forced feed, or suction. The technique which is used will depend on the equipment on hand or on what a particular job will justify in way of expense. Many different types of brushes, dipping tanks and spray guns are available, and it will be useful to review recent issues of trade journals in order to ascertain what is now on the market.

While many successful and profitable installations consist of very simple brushing and spraying equipment, it may be well worthwhile to utilize types of lacquers that require special baking ovens and temperature-controlled equipment. These often accelerate the drying and bring out the best properties of a particular coating. Air-conditioned rooms and control of dust and humidity are also frequently of much value. It is true that the larger the installation, the more likely it is that refinements will result in savings. However, it is always useful to compare costs with those for simple air drying.

With so many types of lacquers now available and so many techniques for using them to best advantage, the use of such finishes for copper and its alloys should serve to improve and protect these materials—and, at the same time, they may help to overcome the current scarcity of other materials, such as metals used for plating.

Manufacturers of articles which may benefit by the use of lacquers are urged to discuss their requirements with one or more of the well-known suppliers of such finishing materials.

Memos on Brass—No. 23

Its non-rusting properties make brass an ideal material for articles or parts that must have a long life. Where corrosive conditions are severe, other copper alloys, such as Duronze, are successfully used.

New Military Trucks Use Much Copper

Typical among military trucks is one model with 2½-ton capacity, a truck ordered in large quantities by the Army. Copper is utilized in it to a greater extent than any other non-ferrous metal, with more than 70 pounds of copper and copper alloys included in many important applications, according to a recent issue of *Automotive Facts*.

COPPER ALLOY BULLETIN

ALLOYS OF COPPER

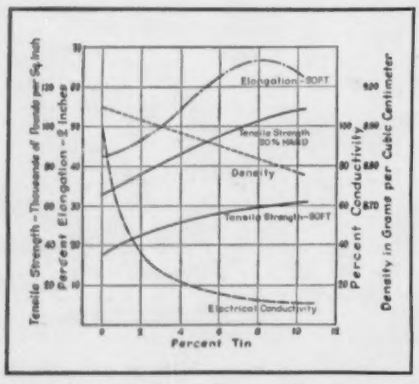
This is the twenty-seventh of a series of articles on the properties and uses of the copper alloys, and begins the subject of the copper-tin alloys.

PROPERTIES OF THE COPPER-TIN ALLOYS

The various types of copper and the more important copper-zinc alloys, with their various modifications, have been discussed in past issues of the COPPER ALLOY BULLETIN. The copper-tin series of alloys will now be discussed.

The copper-tin alloys are generally considered to be true bronzes. However, not all bronzes are copper-tin alloys. Those alloys in which the term "bronze" is used with some other metallic descriptive name, such as aluminum bronze or manganese bronze, have no relation to the copper-tin alloys. Because of the fact that copper and tin alone do not readily alloy, small quantities of phosphorus are almost always added to the copper-tin alloys, and the alloys become known to the trade as phosphor bronze. These articles will therefore be concerned with the properties and uses of the phosphor bronze alloys.

As in the copper-zinc alloys, there are numerous types of phosphor bronzes, containing various amounts of tin up to about 10%. The effect of tin on the various properties of the alloys in shown in the accompanying curves. These properties are based on alloys containing about 0.10% phosphorus. It is noteworthy that above about 8% tin content, the alloys drop slightly in elongation properties, although the strength continues to increase. This rather slight indication reflects the much greater difficulties encountered in processing higher tin alloys. Future articles will discuss the alloys in more detail.



Effect of tin content on the properties of bronze (copper-tin alloys).

Strong Joints Made In Large Pipe Lines With Bronze Welding

Using Bridgeport Bronze Welding Rod, a well-known midwestern city has achieved more than satisfactory results in making strong, lasting welds on pipe lines at its water works.

Concerns using welding rod in industry and construction are turning more and more to Bridgeport's line of rods. Bridgeport rods are called "equal to any job"..."worthy of your skill." They are pure, reliable, uniform and workable for use on all cast iron, steel and bronze work, both for fabrication of shapes and for maintenance and repair applications.

To help you select and utilize the rod most suitable to your types of work, a new "Manual on Bronze Welding Alloys" has been issued by Bridgeport Brass Company. Copies of this helpful, illustrated handbook are available without charge upon request.

Unusually large jobs, such as this on big diameter pipe, are taken in stride by Bridgeport's high quality bronze welding rods.

Solomon—Copper King

King Solomon, famous for his wisdom and wives, was also the greatest copper magnate of his time, it has been disclosed by recent excavations at Ezion-Geber. Mammoth copper smelting furnaces helped make this Red Sea city one of the most important factory towns and seaports of the ancient world. The copper goods manufactured in the refineries were exported to all parts of the Orient. The returning fleets brought back "gold, silver, ivory, apes, peacocks," and other luxury products described in the Old Testament.

NEW DEVELOPMENTS

An automatic drill remover eliminates the use of a drift or key. The attachment automatically releases the drill when the spindle is fed up until its top contacts the device. This operation is called quick and simple, and, in addition, breakage of drills is prevented because the operator has both hands free to grasp it during removal. **(No. 250)**

A tap grinder for sharpening taps on the chamfer is said to permit insertion or removal of taps in a few seconds and has a simple locating device to insure correct positioning and duplication of work. Sharpens two-, three-, four-, and five-flute taps and can be equipped to handle six-, eight-, or ten-flute taps, either right or left hand. **(No. 251)**

A heavy duty sander has been developed to meet demands for faster schedules. It is reported designed for constant production use with 9-inch abrasive discs for covering large areas and turning out large output. **(No. 252)**

A centering chuck recently made available makes a centering machine out of almost any medium sized drill press, according to the maker of the new tool. It is said to operate at high speed. **(No. 253)**

Swiss type automatic screw machines are now being made in America and are called the equal in extreme accuracy and other properties of the highly regarded precision machines formerly imported. They are said to have unusual simplicity of construction, ease of operation, flexibility, low tooling cost and high speed. **(No. 254)**

A seam welder for non-ferrous sheet metal is reported to give freedom from any annealing effect at the joint. It has been developed to join longitudinal and radial seams for tubes, tanks, cans, boxes, boilers, and other equipment. The apparatus cools the seam practically simultaneously with the welding operation, it is said. **(No. 255)**

A tapping machine will handle holes of different depths without altering the position of the depth stop, it is reported by the maker. It handles ¼ to ½ inch taps and automatically reverses, it is stated. **(No. 256)**

A soldering iron for production-line use has a motor-driven blower mounted beside it to pull fumes and smoke away. The iron is readily adjustable and comes in sizes from 44 to 700 watts input. **(No. 257)**

A duplicating brake bends angles and channels to .001-inch in production quantities, thus eliminating the need for press tools on many jobs, it is stated by the maker. Bends to 110 degrees and handles up to 8 inches width, it is reported. **(No. 258)**

This column lists items manufactured or developed by many different sources. Further information on any of them may be obtained by writing Bridgeport Brass Company, which will gladly refer readers to the manufacturer or other source.

PRODUCTS OF THE BRIDGEPORT BRASS COMPANY

Executive Offices: BRIDGEPORT, CONN.—Branch Offices and Warehouses in Principal Cities

SHEETS, ROLLS, STRIPS—*Brass, bronze, copper, Duronze**, for stamping, deep drawing, forming and spinning.

CONDENSER, HEAT EXCHANGER, SUGAR TUBES—For steam surface condensers, heat exchangers, oil refineries, and process industries.

*Trade-name.

PHONO-ELECTRIC* ALLOYS—High-strength bronze trolley, messenger wire and cable.

WELDING ROD—For repairing cast iron and steel, fabricating silicon bronze tanks.

LEDRITE* ROD—For making automatic screw machine products.

BRASS "Bridgeport" CO.

Established 1865

COPPER WATER TUBE — For plumbing, heating, underground piping.

DURONZE ALLOYS — High-strength silicon bronzes for corrosion-resistant connectors, marine hardware; *hot rolled sheets* for tanks, boilers, heaters, flues, ducts, flashings.

BRASS, BRONZE, DURONZE WIRE— For cap and machine screws, wood screws, rivets, bolts, nuts.

FABRICATING SERVICE DEPT.—Engineering staff, special equipment for making parts or complete items.

BRASS AND COPPER PIPE—"Plumrite"* for plumbing, underground and industrial services.

BRIDGEPORT BRASS

strength for the weight used.

Features incorporated in the design of this rotating bucket car are a new and totally-enclosed spindle-type mounting for the turntables and completely enclosed unit assemblies for all of the driving mechanism.

In this type of car the circular skip buckets are deposited on turntables which are rotated by an electric motor while the material is being charged, so as to deposit the stock in the buckets in even layers. This new design includes an extremely rugged spindle mounting, of the totally-enclosed type, self-contained, and arranged to eliminate exposed parts, poor lubrication, and other items which have caused excessive maintenance on cars of this type. The entire driving mechanism is immersed in a lubricant and is self-contained. It is connected to the rotating mechanism by flexible couplings, so that any unit can be removed from the car without disturbing other elements. The motor and brake of the turntable mechanism are well protected and readily accessible.

Because of severe impacts which are possible when the skip buckets are deposited on the car turntables, this type of car is provided with a motor-operated scale relieving mechanism to lift the weigh platform off of the scale knife edges, and thus protect them from damaging blows and excessive wear. A simple eccentric shaft mechanism operates the scale relieving mechanism. Here again the connections are by means of flexible couplings and totally-enclosed special reducer units, to insure adequate lubrication and protection for all of the gears and bearings.

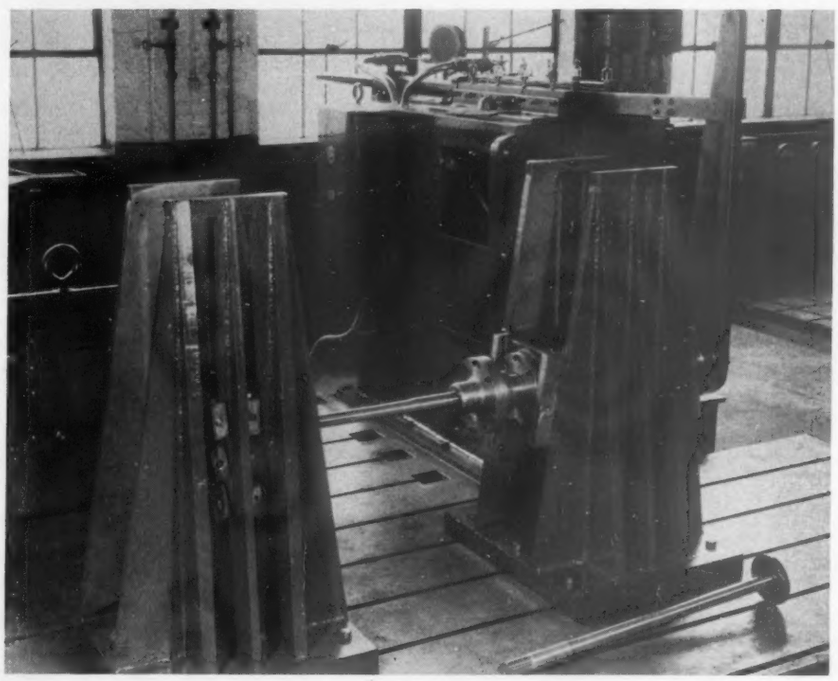
The essential feature of a good scale car is a high-grade weighing scale, which will function accurately over long periods of time, stand up satisfactorily under severe conditions, and require minimum maintenance. Special scales for this service have been developed along two general lines. The underslung roller suspension type allows the scale levers to float freely between the load and the frame, and thus eliminate most of the shocks of acceleration and deceleration from the scale knife edges. These scales have extremely generous knife edges and bearing seats, and an extremely heavy design throughout. The loop suspension self-aligning type is a heavy all-steel welded unit. It is not so heavy or substantial as the roller suspension unit, but, with proper design and adequate proportioning of parts, excellent results have been obtained from such scales in service.

The scales are connected to an indicating dial to insure rapid and accurate weighing. Most scale dials have been designed for dormant service, where the instruments are not moved. But on scale cars, which are constantly in operation, with frequent starts and stops, a more rugged and dependable instrument has been developed solely for scale car service; it is also arranged to mount various types of electrically-actuated recording mechanisms. The most popular of these is of the strip type, which provides a graphic record on a graduated paper chart about 6 inches wide. This is the type generally preferred for quick reference by the blast furnace superintendent, since such a record is usually not more than 24 inches long per turn, and provides data which are easily and quickly checked because any irregular point on the graph immediately attracts attention.

The other type of recording mechanism is preferred where the record is used for clerical purposes, such as checking weights from the stockyard to the blast furnace. This type prints the record in legible figures on a paper ribbon about 1-inch wide. This ribbon is contained in a small compartment at the side of the recording instrument, from which it can be removed readily without opening the main compartment.

Scale cars of similar design are used in many other industries, and all have benefitted from the improvements which have been made in blast furnace scale cars during the last 40 years.

A "Substitute" that Deserves Attention



■ **If "substitute" materials forced on producers of peace-time products measure up to performance records of a new steel, Axaloy, recently developed by the Timken-Detroit Axle Co., 100 Clark avenue, Detroit, "original" materials will take a great deal of refining to win back their former status. View above shows the new steel being tested for its "toughness" in the form of axle shafts for automobiles and trucks. In torsional fatigue tests, at 30,000 40,000 and 50,000 pounds per square inch made on this machine and in actual service, the axle shafts recorded performances heretofore believed impossible, according to the company**

Issues New Code for Measurement of Water

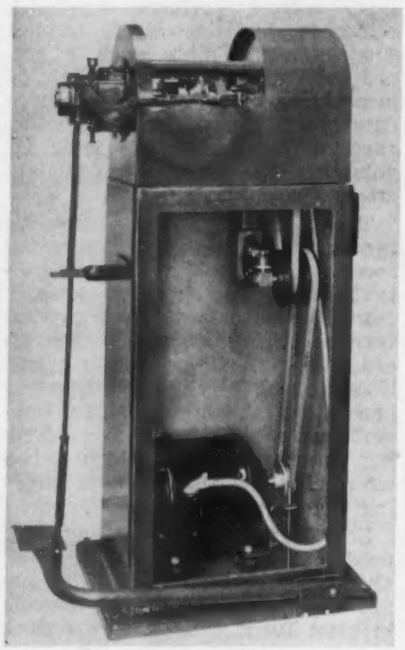
■ A code for the measurement of water using standard ISA orifices with free discharge, prepared for manufacturers of deep well turbine pumps as a guide in field testing deep well turbines when higher precision capacity measuring equipment is not available, has been published by Hydraulic Institute, 90 West street, New York.

Prepared with the assistance of the engineering department of the University of California, it contains specifications for a single preferred construction of orifice and orifice holder and shows three preferred orifice sizes for each pipe size. With these limitations, charts also were prepared giving the flow in gallons per minute as a function of the head on the orifice. Each copy of the code is available for $1.

Industrial Equipment

Variable Speed Lathe

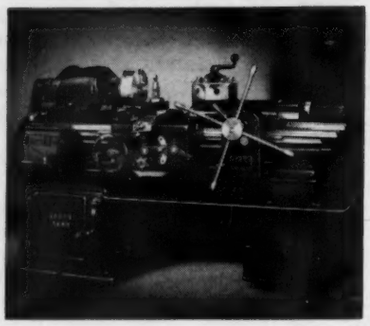
■ Schauer Machine Co., 2060 Reading road, Cincinnati, announces a new low speed, high power Vaie variable speed lathe for lapping or polishing small metal and plastic parts. It produces speeds as low as 20 revolutions per minute, plus



ample power for heavy work, at speeds up to 4000 revolutions per minute. These are in a ratio of 5½:1 based on the lowest speed desired by using a single-speed motor, or 11:1 with a 2-speed motor. The lathe's motor is spring-mounted —thus automatically controlling belt tension. The spindle is equipped with 3 or 4-jaw chuck, or special holding fixtures to meet individual requirements.

Turret Lathe

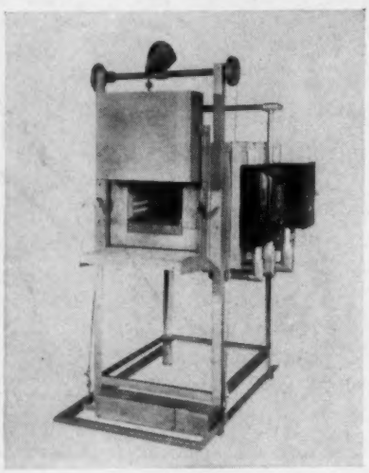
■ South Bend Lathe Works, Dept. 6S, South Bend, Ind., has placed on the market a new 16-inch swing turret lathe designed for rapid production on chucking operations and bar work. It features a 16¼-inch swing over the bed ways and saddle wings, 9⅝-inch swing over the tool post saddle cross slide, 1¾-inch hole through the headstock spindle and 1-inch capacity collet. Its ram type turret has both power and hand feed, with automatic indexing and individual stop for each of the six turret faces. A quick change gear box provides 48 changes of turret power feeds, also 48 changes of both the cross and longitudinal feeds



for the tool post carriage and a series of 48 screw threads, 4 to 224 per inch. Provision also is made for changing the direction and speed of the turret feeds with relation to the carriage feeds. Twelve spindle speeds ranging from 10 to 731 revolutions per minute are available. A 2-speed motor permits quick change from high to low speed for reaming and tapping operations.

Electric Box and Muffle Type Furnaces

■ H. O. Swoboda Inc., 178 Thirteenth street, New Brighton, Pa., announces a new line of Falcon electric box and muffle type furnaces adapted for general and specific applications in either factory or laboratory. They are arranged for either floor or bench mounting, and are equipped with heavy alloy heating elements to assure efficient operation at temperatures up to



2300 degrees Fahr. Heating elements are supported in refractories arranged in top, bottom, side and rear walls of the furnace. Furnace chamber is completely surrounded by durable block type insulation. Automatic temperature controls are mounted on the side of the furnace, completely wired for connecting to power supply. The furnace also is equipped with a foot-treadle operated door mechanism.

Sharpening Attachment For End Mills

■ Brown & Sharpe Mfg. Co., Providence, R. I., has placed on the market a No. 13 end mill sharpening attachment for sharpening both the peripheral and end teeth of end mills. It also is of particular value in sharpening the peripheral teeth of steep spiral end mills having straight or taper shanks. For the latter work, a knob at the rear end of the attachment spindle makes it an easy matter to hold the tooth being ground in contact with the tooth rest while feeding the cutter across the wheel by longitudinal table movement. The attachment spindle is carried in a

body that can be set at an angle in both a horizontal and vertical plane, with rigid clamping provided for both adjustments. Graduations to 2 degrees provide for angular settings to 16 degrees either side of zero in the vertical plane, and to 90 degrees either side of zero in the horizontal plane, the base itself being aligned by the scraped inverted V of the table top. Zero marks 180 degrees apart on the spindle body provide for sharpening both right and left-hand cutters. End mills having a No. 9 B & S taper shank will fit into the attachment spindle while cutters having shanks of other tapers, as well as cutters with milling machine standard taper shanks and straight shanks, are accommodated by stock collets and adapters.

Threading Machine

■ Landis Machine Co., Waynesboro, Pa., announces a new high speed hand-operated ⅜-inch threading machine for producing precision threads such as are required in the automotive and aircraft industries. Its operations are controlled

4 Years ago HOLDEN announced a high speed bath for MOLY steels

October 25, 1937
STEEL
PRODUCTION • PROCESSING • DISTRIBUTION • USE
FOR FORTY-EIGHT YEARS—IRON TRADE REVIEW
A HIGH SPEED BATH for 'Moly'
And now, following two years of careful development, The A. F. Holden Company presents a newly perfected High Speed Bath for molybdenum as well as tungsten high speed tool steels. Hardening of high speed steel without decarburization no longer remains a problem to the manufacturer and user. "Moly" whose popularity has increased with the scarcity of tungsten, can be successfully hardened without decarburization or change in size. The important part in this new development is the HOLDEN CERAMIC POT which produces scale free work with maximum hardness and an assured savings of, from 10 to 30 per cent.
Processing Time Reduced 50%
This new equipment is controlled and sold exclusively by The A. F. Holden Company. Holden Engineers can save you from $500 to $5000 in the next twelve months.
A new folder describing the process is available on request.
Wire or Write Us Today
A. F. HOLDEN COMPANY
New Haven
Conn.

Today..

8 Leading High Speed Tool Manufacturers

se HOLDEN BATHS....SAL-WAY Steel Treating Company, Detroit, Mich., have used Holden Baths over 5 years....Today they have a personnel of 50 people....harden ne to three tons of HIGH SPEED STEELS daily....use HOLDEN BATHS EXCLUSIVELY!

THE A. F. HOLDEN COMPANY, New Haven, Conn.

by one lever which permits the operator freedom of one hand for loading and unloading the work. In operation grips are opened at the extreme end of the return stroke of the operating lever, and are closed automatically during the first portion of the forward stroke. The advance of the carriage is then controlled by the continuation of the forward stroke until the end of the thread is reached, at which time the die head is automatically tripped open. The die head is closed automatically during the return stroke of the carriage. The gripper unit consists of a spring-loaded toggle mechanism completely housed in the carriage. Interchangeable grips are used to hold diameters of work within the capacity range of the machine. Means also are provided for centralizing grips with the center of spindle and die head. The design of the gripper units permits loading work from the top. The spindle of the unit is mounted on ball bearings fully protected and

sealed against coolant and grit. The bearings are lubricated from a reservoir of oil contained in the spindle assembly. The drive to the spindle is through a single V-belt operating on sheaves having four setups. These provide spindle speeds of 270, 338, 520 and 845 revolutions per minute. A lever facilitates belt adjustment for any one of the above spindle speeds.

Box Wrench Set

■ Bonney Forge & Tool Works, Allentown, Pa., has placed on the market a new set of box wrenches with double hexagon openings and heads placed at 15-degree angles. Known as set No. 36, it contains two short type and four long type wrenches, each with a different size opening in each end. The wrenches are especially adapted to all production and service work with low overhead clearance, and either side of the head may be applied to the nut or bolt. Openings included in the short type wrenches are ⅜ and 7/16-inch and ½ and 9/16-inch. In the long type wrenches the following

openings are included: ⅜ and 7/16-inch; ½ and 9/16-inch; ⅝ and 11/16-inch; and ¾ and 13/16-inch. For convenience, all wrenches in the set are furnished in a durable, leatherette roll.

Plastic Outlets

■ General Electric Co., Bridgeport, Conn., has introduced new high and low-tension outlets totally encased in Tenite for fiberduct underfloor raceway systems. These are being offered in place of former brass outlets used with fiberduct. The nonmetallic surface of these outlets is said to make them an ideal accessory as they withstand breakdown tests of 4500 volts.

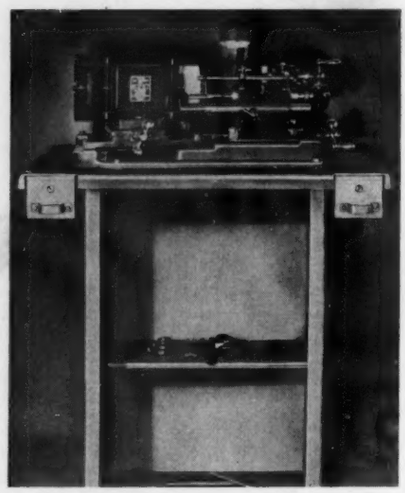
"Fingerless" Gloves

■ Industrial Gloves Co., Danville, Ill., announces "fingerless" gloves for operators who must have complete freedom of the fingers. Although fingerless, the gloves pro-

vide complete protection for the palm of the hand and between thumb and forefinger. They are of chrome tanned long wearing split leather, steel stitched to eliminate possibility of ripping. They may be worn over the bare hand or pulled over light weight gloves.

Tap Grinder

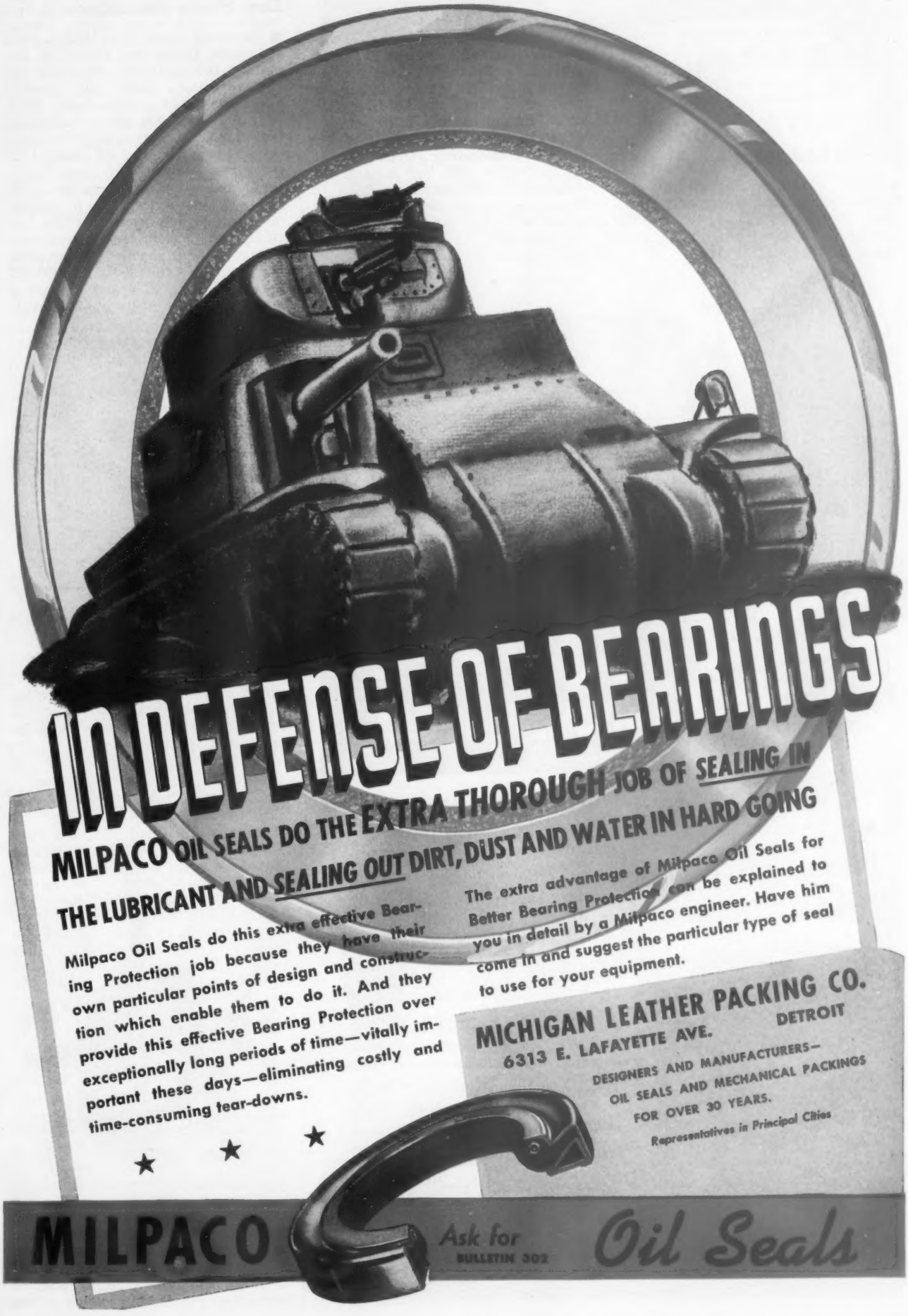
■ Edward Blake Co., 634 Commonwealth avenue, Newton Centre, Mass., announces a new No. 1 and 2 tap grinder and a new J-B tap grinder knee-room pedestal for sharpening taps on the chamfer. The units will sharpen 2, 3, 4 and 5-flute taps and may be equipped for grinding 6-flute taps or 6, 8 and 10-flute taps—both right and left hand. Taps may be inserted or removed from each machine in a few seconds, and a simple locating device insures correct positioning and duplication of work. The desired relief is obtained by a simple screw adjustment of an eccentric mechanism. The motor head unit may be swiveled in a wide arc on any de-



sired chamfer angle. Rapid and positive in operation, the machine requires little operating training. The grinders are furnished complete with motor, two grinding wheels, wheel guards, diamond wheel dresser, wrenches, one draw-in master collet and two bell centers. The pedestal may be furnished as an optional extra. It is designed for maximum efficiency for either the seated or standing operator. Two drawers accommodate extra bushings, wrenches and other tools.

Bearing Unit

■ American Manganese Steel Division, The American Brake Shoe & Foundry Co., Chicago Heights, Ill., announces a bearing unit to simplify adjustment and alignment of bearings in its larger size dredging pumps. According to the company's announcement, the aligning feature is provided by the spherical surfaces on the outer cartridge faces and the adjustment is provided by the threaded sleeve and socket ar-


IN DEFENSE OF BEARINGS
MILPACO OIL SEALS DO THE EXTRA THOROUGH JOB OF SEALING IN
THE LUBRICANT AND SEALING OUT DIRT, DUST AND WATER IN HARD GOING
Milpaco Oil Seals do this extra effective Bearing Protection job because they have their own particular points of design and construction which enable them to do it. And they provide this effective Bearing Protection over exceptionally long periods of time—vitally important these days—eliminating costly and time-consuming tear-downs.
The extra advantage of Milpaco Oil Seals for Better Bearing Protection can be explained to you in detail by a Milpaco engineer. Have him come in and suggest the particular type of seal to use for your equipment.
MICHIGAN LEATHER PACKING CO.
6313 E. LAFAYETTE AVE. DETROIT
DESIGNERS AND MANUFACTURERS—
OIL SEALS AND MECHANICAL PACKINGS
FOR OVER 30 YEARS.
Representatives in Principal Cities
MILPACO
Ask for BULLETIN 302
Oil Seals

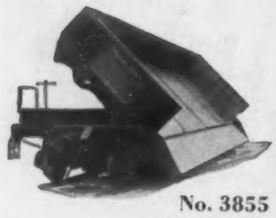
rangement. The sleeve here is readily accessible through an opening with a spanner wrench or screw driver. The bearing unit is lubricated separately from the sleeves and is not subject to contamination from oil which may come through the sleeve bearings.

Vibro-Insulators

■ B. F. Goodrich Co., Akron, O., has introduced for specialized services, three additional new Vibro-Insulators, mountings of rubber and metal to isolate vibration. These are known as types 44, 50 and 60.

The first is for use with gas burners, the second is used to isolate vibration and noise of exhaust and intake fans. Type 44 is furnished with the rubber either in shear or in compression. In shear, the maximum loading is 10 pounds, deflection at that load 5/32-inch and minimum disturbing frequency at that deflection 1200 per minute. In compression the maximum load is 50 pounds, deflection at this figure ⅛-inch and the minimum disturbing frequency at 5/32-inch deflection 1350 per minute.

MOVE YOUR MATERIALS FASTER • MORE PROFITABLY with KOPPEL INDUSTRIAL CARS



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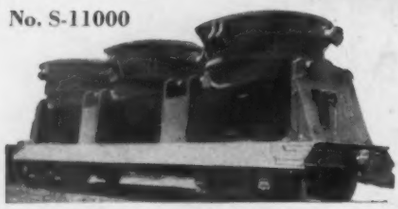

Koppel-built cars set the pace for faster handling of materials — more efficient waste disposal—lower operating and maintenance costs.

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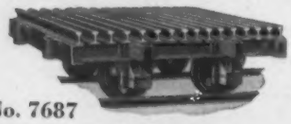


No. 7687

OVER 75 TYPES OF KOPPEL CARS DEMONSTRATE THESE ADVANTAGES

- High Pay Load Capacity
- Quick, Clean Dumping Action
- Rugged Durability
- Minimum Maintenance Per Ton
- High Tensile and Abrasive Resistant Steel Construction When Desired.

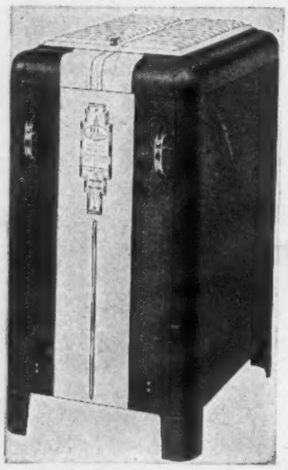
Do you have our descriptive Bulletin 71 on file?

KOPPEL

PRESSED STEEL CAR CO., INC.
(KOPPEL DIVISION)
PITTSBURGH, PA.

Dry Plate Rectifiers

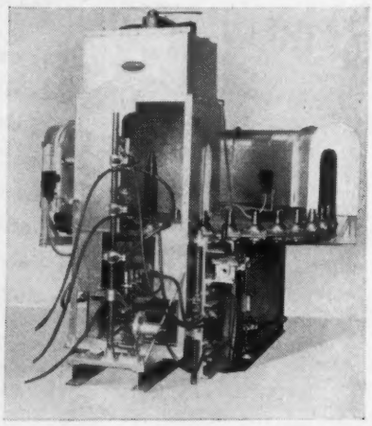
■ Benwood Linze Co., 1815 Locust street, St. Louis, has placed on the market B-L dry plate rectifiers for electroplating. These are flexible and economical in operation. They may be used to serve individual tanks, or a number of units may be grouped together in parallel to meet the demands for heavy current loads; or the units may be grouped in series for maximum high voltage requirements. The rectifiers are assembled in cabinets. Compact and mobile, the models are available for 300 and 500-ampere capacities, at 6 and 12 volts—operating from 230 and 440 volt,



three phase, 60 cycle, alternating current. Control units which provide a variation in voltage from the maximum for the unit down to zero volts, also are available.

Spray Machines

■ Eclipse Air Brush Co., 400 Park avenue, Newark, N. J., has introduced electric-eye controlled auto-

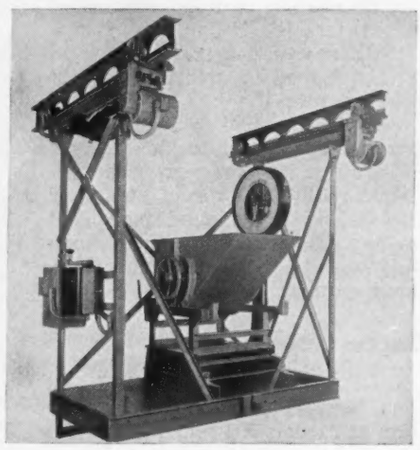


matic spray machines for coating the inside and outside of projectiles in one operation. Shell to be finished are placed on the indexed turntable of each machine manually, carried around to a position in front of the

automatic spray guns that coat the outside, while an extension nozzle on another gun comes up to spray the inside. Gun action is controlled entirely by the electric eye device so that there is no spray unless a shell is in the holder. After being sprayed, the shell enter a steam jacketed oven that is built over the back of the table. When they emerge from the oven, the projectiles are removed. Each machine is said to handle 75 millimeter armor piercing shell at the rate of 500 per hour.

Batch Scale Car

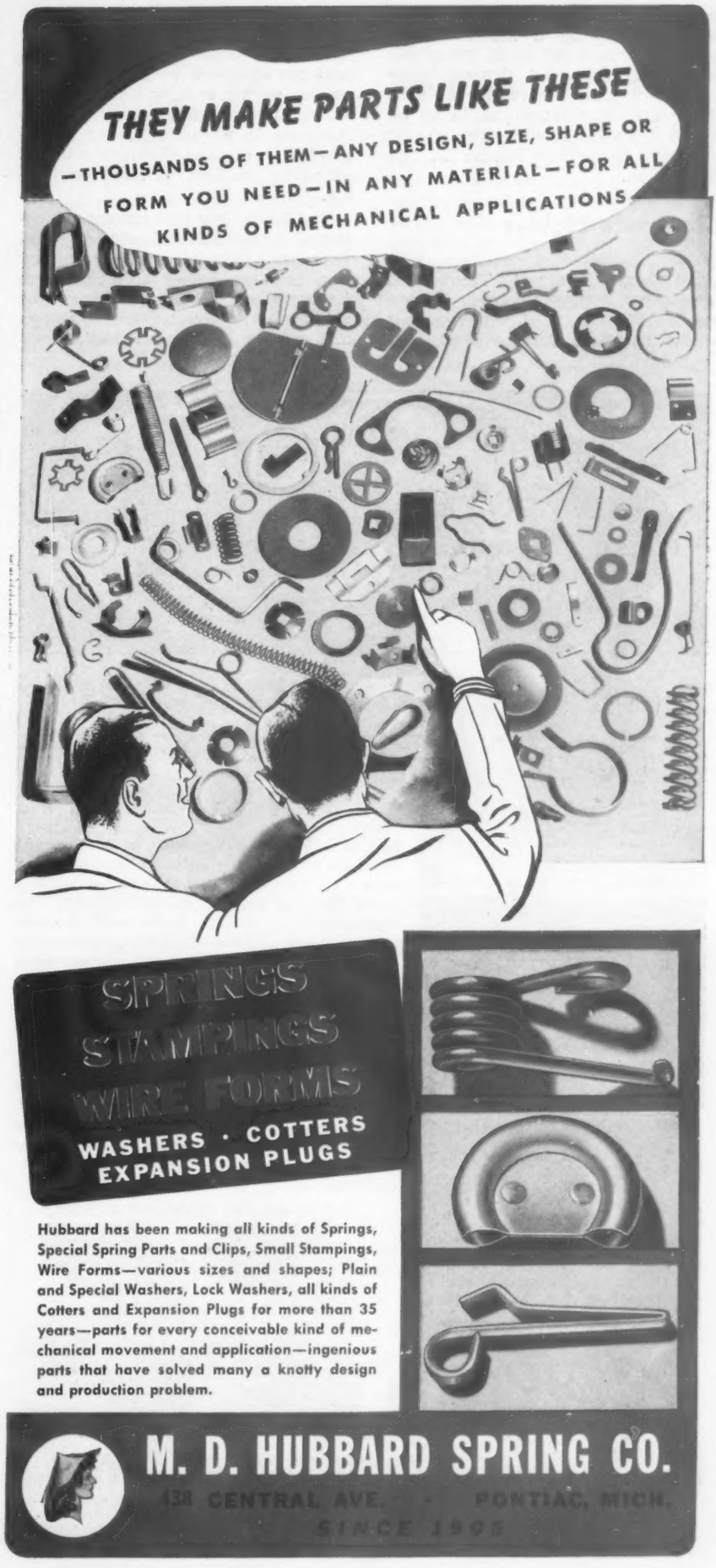
■ Cleveland Crane & Engineering Co., Wickliffe, O., has placed on the market a traveling batch scale car for handling batch materials entering into the manufacture of rubber and clay products. It also can be adapted for handling chemicals and batch materials used in a variety of industries. The car is motor driven and controlled by a riding operator. It travels at any speed up to 300 feet per minute, speeds being controlled



by a variable speed drum controller. Double overhead rails enable bin chutes to be brought close to the car bucket. Because the scale on the car weighs ingredients as they are dumped in, the unit makes it possible to gather the exact amounts from various bins that go to make up a batch. The bucket is emptied by tilting. The car illustrated will handle batch loads of ½-ton.

Tube Fittings

■ Harris Products Co., 5435 Commonwealth avenue, Detroit, has placed on the market new Sealflex tube fittings for handling high pressures while permitting vibratory flexing up to 10 degrees included angle. They are available in a wide range of standard sizes for handling virtually any fluid. The high pressure capacity and the flexibility of each tube-to-fitting connection is the result of the design which uses an insulating, flexing medium of rubber or synthetic. Yet it is so ar-


THEY MAKE PARTS LIKE THESE
—THOUSANDS OF THEM—ANY DESIGN, SIZE, SHAPE OR FORM YOU NEED—IN ANY MATERIAL—FOR ALL KINDS OF MECHANICAL APPLICATIONS
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STAMPINGS
WIRE FORMS
WASHERS · COTTERS
EXPANSION PLUGS
Hubbard has been making all kinds of Springs, Special Spring Parts and Clips, Small Stampings, Wire Forms—various sizes and shapes; Plain and Special Washers, Lock Washers, all kinds of Cotters and Expansion Plugs for more than 35 years—parts for every conceivable kind of mechanical movement and application—ingenious parts that have solved many a knotty design and production problem.
M. D. HUBBARD SPRING CO.
438 CENTRAL AVE. · PONTIAC, MICH.
SINCE 1905

ranged that the tubing is prevented from slipping by a metal ferrule which is "rolled in" on it. Thus, the connection does not depend upon the strength of the rubber or synthetic and eliminates possibility of pressure swedging down the end of the tube to permit failure of the connection.

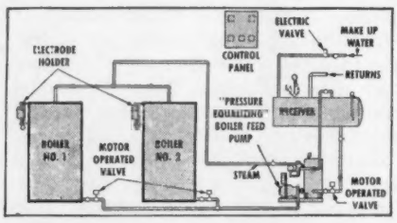
Electrode Holder

■ US Electric Welder Corp., 1224 West Bancroft street, Toledo, O., announces a new electrode holder, special alloy jaws of which permit access to small work without danger of "shorting" jaws on the work. In addition, the holder's jaws will not break when dropped and will hold the electrode at any angle. Its tension spring is fully insulated, the extended lever on upper jaw being designed to permit operator to release stub of used electrode without changing position of hand on handle.

The lower jaw and handle are designed to permit efficient ventilation through inside of handle. Connection between holder and cable can be accomplished in two ways—by soldering or by using the set screws and copper ferrule provided.

Boiler Water Control

■ Johnson Corp., Three Rivers, Mich., announces a new system of multiple boiler water control that maintains safe and proper water levels in two or more boilers with one boiler feed pump. It controls each boiler water level separately, and water is added independently of the other boilers, as the need arises. The system is electrically controlled, completely automatic in operation. Two stationary electrodes, of different lengths, mounted in a small holder on each boiler are responsible for the automatic operation. When the water level in any



boiler falls below the longer electrode an electric circuit is disturbed which starts the boiler feed pump. At the same time a motor-operated valve is opened to divert the pump discharge into the boiler requiring water. This control is suitable for pressures up to 150 pounds for all boilers up to 250 horsepower. It can be used with any type of steam or motor-driven boiler feed pump. It also can be arranged with a duplicate "stand by" or emergency, pumping unit.

Magnetic Filters

■ S. G. Frantz Co. Inc., 161 Grand street, New York, announces the addition of models PQ and PQ1, to the line of permanent magnet Ferro-Filters. These are for capacities

larger and smaller than present machines offered, to protect bearings and for lubrication systems of diesel and other internal combustion engines, turbines, aircraft run-in stands

KENNAMETAL
STEEL CUTTING
CARBIDE TOOLS

Turning Garand rifle barrels in a Fay-Automatic with four KENNAMETAL tools.

Cutting off 90 MM. shells to length and centering the base simultaneously.

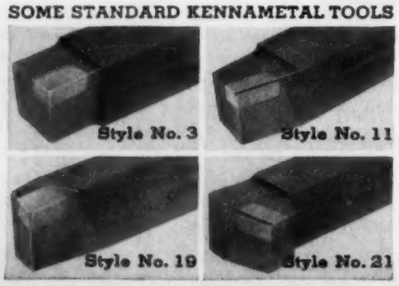
Turning bomber landing gear cylinder at 180 ft. per min. and .046" feed.

Save thousands of man hours on defense jobs everywhere . . .

In gun factories, in shipyards, in Government arsenals, in airplane plants . . . virtually everywhere that steel is being machined for National Defense, you will find KENNAMETAL carbide tools on the job. Because of its faster cutting speeds, KENNAMETAL increases the production of both men and machines from 30 to 50% . . . saving thousands of man hours urgently needed in the Defense effort.

Despite the tremendous demand for KENNAMETAL, shipments of Standard and Modified Standard tools are made within 10 days of receipt of orders; standard tool tips within 3 to 4 days. Some Standard KENNAMETAL tools (supplied in grade KM only) are now carried in stock for immediate delivery. Write for weekly stock list.

SOME STANDARD KENNAMETAL TOOLS


Style No. 3 Style No. 11 Style No. 19 Style No. 21

Visit . . The KENNAMETAL Exhibit at Booth D-55, National Metal Congress and Exposition.

McKENNA METALS Co.
200 LLOYD AVE., LATROBE, PENNA.
FOREIGN REPRESENTATIVES: U. S. STEEL EXPORT CO. (Exclusive of Canada, Great Britain and Possessions)

and machine tools. Both developments magnetically extract coarse and fine iron particles (even as microscopically small as 1/25,000-inch diameter) from suspension in circulating oil systems. Each is designed on the same principles of electrically energized units, except the stack of screens are energized by two powerful permanent magnets. The new units require no electric power and all parts are accessible for quick cleaning.

Bench Lathes

■ Sheldon Machine Co. Inc., 1624 North Kilbourn avenue, Chicago, announces new 11 and 12-inch lathes featuring a 1-inch capacity spindle hole having 1⅝-inch diameter. Equipped with preloaded ball or precision roller bearing headstocks they

are available in both bench and floor types with semiquick or full quick change gear boxes. The units incorporate plain aprons or worm feed. They are offered with either a needle bearing overhead motor drive, or 4-speed lever operated underneath motor drive which is entirely enclosed in a cabinet leg. Also a complete line of attachments and accessories are offered.

Fluorescent Photometer

■ Westinghouse Lighting Division, 1216 West Fifty-Eighth street, Cleveland, announces a photometer for fixtures using fluorescent lamps which can measure light output and distribution of units as large as 10 feet in diameter. It consists of a heavy rotating base which supports an adjustable arm. The luminaire is securely attached to this arm and can be rotated to any position desired for the reading.

Measurements are made by a photocell mounted at the same height as the luminaire at a given distance away. Light, as it strikes the cell, is transformed into minute currents which are measured by a microammeter or galvanometer. This current output is directly proportionate to the amount of light falling on the cell. Operating lamps at rated voltage, the current output of the photocell is measured with the luminaire rotated to various angles about the cell. From these readings the candlepower distribution can be computed.

Gage Blocks

■ George Scherr Co., 128 Lafayette street, New York, has introduced a 34-piece gage block set for use in aircraft and munition industries. Known as the Ultra-Chex Inspecto-set, it will make up about 80,000 combinations in steps of 0.00001-inch from 0.300 to 8 inches.

Besides the gage blocks, the set includes an optical flat which is used for checking the gage blocks, micrometer anvils and other lapped surfaces for parallelism and planeness.

Steel Grating

■ Wm. F. Klemp Co., 6611 South Melvina avenue, Chicago, has introduced a new type welded steel grating for use as passage ways and platforms inside or outside or between buildings, for ramps and stair treads. It is made of hot rolled hexagonal steel bars placed at right angles on top of flat bearing bars set on edge, and then electro-welded under great pressure. The cross rods, sunk flush and welded into the

THE THIN RED LINE OF FAILURE
BY THE MAGNIFLUX METHOD

PERFECTION,—no less,—is demanded of the parts made for a fighting airplane engine. Hidden flaws there dare not be. Material and workmanship *must* be perfect.

The Ahlberg inspector you see in this picture is searching for hidden flaws by means of the Magniflux test,—a test so sensitive that a faint microscopic crack, invisible at the surface, is revealed by means of magnetism as a *thin red line.*

The reputation of Ahlberg bearings for perfection results from the combination of merciless inspection, of the finest materials and the use of methods and equipment that is the last word in precision manufacturing.

That is why you will find Ahlberg bearings so often used where perfect performance is the only thing that counts.

CJB AHLBERG

AHLBERG BEARING COMPANY
Manufacturers of CJB Master Ball Bearings
3015 West 47th Street - - - Chicago, Ill.

bearing bars, make a rectangular mesh that provides capacity for heavy loads, easy travel and security for the operative on foot.

All joints are smooth—yet the bearing bars, and the upper angle of rods make an efficient nonslip surface. The grating is offered with the main bars on 1 3/16-inch centers, in panels 24 inches wide and lengths to 35 feet. Other spaces, however, can be furnished.

Hydraulic Riveter

■ Hanna Engineering Works, 1765 Elston avenue, Chicago, has placed on the market a new portable hydraulic riveter which is free to rotate or tilt in any position. Its riveting cycle is initiated by a push button. The rivet die advances rapidly at low pressure until it contacts the rivet. The pressure then increases as the rivet is driven—all automatically. Pressure exerted by the riveting die may be regulated by turning the tonnage control dial. The riveter also adjusts itself automatically to variation in the thickness of work being riveted. Its ram pressure is 17½ tons. Completely enclosed, the unit's high pressure pump is belt-driven by a 2-horsepower horizontal motor. Pump, relief valve, pressure gage, tonnage adjustment, oil level gage, oil filter, motor starting switch, and piping are all mounted on a single panel which can be removed as a unit.

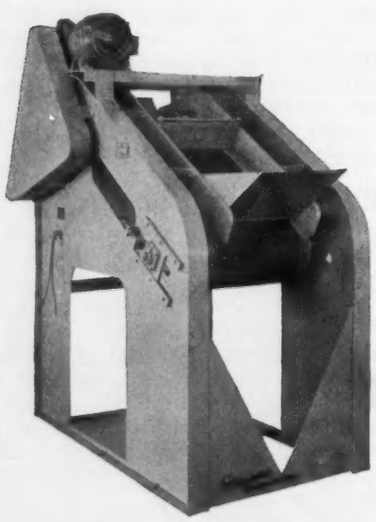
Two and Three Shift Drawer Inserts

■ Lyon Metal Products Inc., 3119 Clark street, Aurora, Ill., announces two and three shift drawer inserts

for individual storage of tools, records, or personal effects of workers on two and three shifts. These may be furnished on work benches, tool stands, shop desks, and under counters. Drawers slide easy and have flat key locks.

Magnetic Separator

■ Stearns Magnetic Mfg. Co., 650 South Twenty-eighth street, Milwaukee, announces a special type LD magnetic separator for reclaiming scrap welding rod coating effectively and economically. In it the material is fed through a spout onto a fast moving short belt conveyor set at an angle of 30 degrees and equipped with skirt boards to prevent spillage. The material leaves the belt at high velocity to meet the face of a heavy, nonmagnetic screen which separates the



For Any Type of Steel Mill
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With minimum interference to your normal operations, plant extensions or modernization programs are completed promptly and efficiently by BRASSERT. Our broad experience and engineering skill are backed by complete construction facilities.
BRASSERT SERVICE INCLUDES
Consulting engineering covering raw materials, technical, commercial and financial aspects of present or prospective enterprises.
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FIRST NATIONAL BANK BUILDING, PITTSBURGH, PA.
60 EAST 42nd STREET, NEW YORK CITY

fines from the coarse material before it reaches the spout ahead of the magnetic drum. The unit is enclosed in a welded steel frame. Separators can be designed in various sizes to suit capacities and have unlimited possibilities in factories and smelting plants where mixed materials are handled.

Paving Breaker

■ Ingersoll-Rand Co., Phillipsburg, N. J., announces a new 60-pound "cushioned-air" paving breaker, known as the CC-60, for use in connection with hard clay, shale, brick, concrete, or for jobs where it is not

feasible to use a heavier tool. The ease in handling this tool comes from an air cushion which absorbs the blow of the piston when the steel is not in contact with the work. Consequently, there is far less fatigue for the operator and less breakage of parts. The breaker weighs 63 pounds and is 27 inches long. It is equipped with a ¾-inch hose.

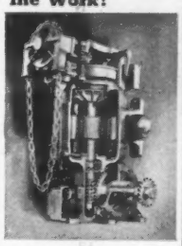
Grinding Machines

■ Cincinnati Grinding Machine Inc., Cincinnati, has placed on the market a new line of hydraulic universal grinding machines, built in 14, 16 and 18-inch swings and 36, 48 and 72-inch between-center lengths for each swing. Table of each of the grinders is powered hydraulically, having infinitely variable traverse rates of 3 to 220 inches per minute. Table stroke may be set as short

as 3/32-inch, simulating the action obtained from a reciprocating grinding wheel spindle. The hand-table traverse has two speeds (mechanically controlled)—1/10-inch per turn of the handwheel for close adjustment and grinding shoulders; 15/16-inch per turn for setting up. Filmatic bearings are used for the main grinding wheel spindle. Each consists of five heavy steel shoes with bronze lining next to the spindle. The shoes are constructed to create wedge shaped oil films, and are self-adjusting for variations in load produced by the variety of grinding cuts. The wheel head of each grinder may be swiveled 90 degrees right and left. Mounted directly on top of the wheel head unit is a 5-horsepower motor which drives the grinding wheel spindle through V-belts. The headstock incorporates a new type of drive known as the Speed Ranger. By merely turning a handwheel at the front of the unit, an infinite number of speeds may be selected, ranging from 25 to 225 revolutions per minute. The unit also incorporates a quick-change device for live or dead spindle operation. Like the hand table traverse, hand cross traverse has 2-speed arrangement. The graduations on the rim behind the handwheel constitute a convenient innovation in grinding machine controls, especially for repetitive multiple diameter work.

OPERATE YOUR DOORS FROM
ANY REMOTE POINT!

The rugged Kinnear Motor Operator Does the Work!



You can speed up traffic, step up efficiency, and boost savings in labor-time in your plant with doors that can be opened from any number of convenient points! And Kinnear Rolling Doors have many other advantages. They open upward, saving valuable floor, wall and ceiling space, and staying out of reach of damage. Their rugged, all-steel, interlocking-slat construction has proved its remarkably long life and low maintenance — and it gives you extra protection against fire, intrusion, sabotage, wind, weather and accidental damage. Built any size, to meet any service door requirement in old or new buildings. Write for details or recommendations. Send for Catalog!

The KINNEAR MFG. CO.
1780-1800 FIELDS AVE., COLUMBUS, OHIO

SAVING WAYS IN DOORWAYS
KINNEAR ROLLING DOORS

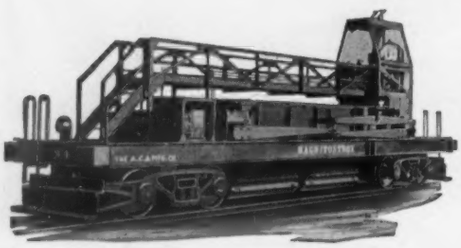
Announces Standard Speeds for Gearmotors

■ In view of the encouragement given industry by OPM to develop simplification programs in co-operation with the United States Bureau of Standards, the American Gear Manufacturers Association recently announced a new standard speed program for gearmotors. This was selected with a series factor of 1.225, using 1750 revolutions per minute as the base, which means that the next lower speed is 1750 divided by 1.225, or 1430 revolutions per minute. The next lower output speed is then obtained by dividing 1430 by 1.225, which is 1170 revolutions per minute, etc. Each output speed, therefore, is a multiple of the factor 1.225 with 1750 representing the starting point.

In working out this new standard, the association's committee found that standard speeds were but part of the task—that it was equally important to adopt some uniform method of rating in order to eliminate differences of opinion on the reserve capacity required for given selections. This called for a practice on the rating and selection of gearmotors, and a "Proposed Recommended Practice for Gearmotors" was worked out and adopted in October, 1940, by the association.

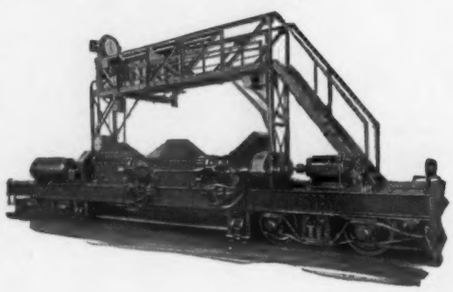
About the same time, the standard output speed program was adopted by National Electrical Manufacturers Association and recommended to the gear association for favorable action. This made it possible for AGMA to adopt this part of the program along with the rating practice. Now nearly all gearmotor manufacturers are co-operating in this new practice in order to do their share in this "emergency" in insuring better deliveries.

ATLAS SCALE CARS



20 Ton — Double Compartment Scale Car. Journals provided with self aligning anti-friction bearings. Equipped with Atlas Indicator and Recorder.

20 Ton Two Compartment Scale Car with Orr Bin Gate Operating Mechanism. Anti-friction bearings. Equipped with Atlas Indicating and Recording Mechanism.



Other Atlas Products

Gas-Electric and Diesel-Electric Locomotives—Car Pushers—Storage Battery Locomotives—Electrically Operated Industrial Cars—Scale Cars and Weighing Cars of all kinds — Ore Transfer Cars and Blast Furnace Charging Cars.

Coke Oven Equipment

Pushers and Levellers—Coal Charging Cars—Door Handling Machines — Coke Quenching Cars.

Also Atlas Patented Indicating and Recording Mechanism for Weighing Scales.

THE ATLAS CAR & MFG. CO.

Engineers . . . Manufacturers

CLEVELAND, OHIO

New Base Coating Extends Finish Life

■ A new five-minute dip zinc coating, known as Irco zinc coat for rustproofing metal during production is reported by International Rustproof Corp., 12507 Plover avenue, Cleveland. It is the base material for a hot, chemical-bath process of treating metal to produce a substantial, permanent, resistant and insoluble film of neutral zinc phosphate on metal.

The coating built up by the bath is a foundation coating, not a finish coating It is said to provide the finish coating applied over it with three to five times longer life. In addition to being highly absorbent, the coating also produces a good bonding surface for industrial finishes.

American Resources Can End War in Short Time

■ *A Short War through American Industrial Superiority,* by Louis Marlio; paper, 51 pages, 5½ x 8 inches; published by The Brookings Institution, Washington, for 25 cents.

Of unusual character this pamphlet is not a documented report based on statistical data but a personal interpretation growing out of the author's long acquaintance with both European and American industrial and engineering problems, followed by first-hand investigation of the American defense program. President Moulton of the Institution vouches for Mr. Marlio's background in business, engineering, economics and government administration in his various connections in France.

The author's conclusion is that the Allied powers are rapidly outstripping Germany in preparedness and will continue to do so, as Germany faces many difficulties in raw materials and manpower for production. The tremendous resources of the United States make possible such an increase in armament that it can overcome Germany's lead and terminate the war quickly if every resource is thrown into armament.

Practice on Copper Conductors Now in Print

■ Copies of simplified practice recommendation R180-41, "Copper Conductors for Building Purposes", are now available according to the Division of Simplified Practice, National Bureau of Standards, Washington.

This recommendation lists 17 stock sizes of copper conductors in the range from No. 14 (American wire gage) to 500,000 circular mills, and recommends that sizes larger than 500,000 circular mills be not carried in stock, but available on order. Purpose is to focus production, distribution, and use on recommended sizes, eliminating unnecessary inventories.

Those who have not yet familiarized themselves with its details are urged to secure a copy. Copies may be obtained from the superintendent of documents, Government Printing Office, for 5 cents each. A discount of 25 per cent on orders for 100 or more is available.

Booklet Describes How Employment Service Aids

■ How the United States Employment Service functions in the present emergency is described in a pamphlet, *Man Meets Job—How Uncle Sam Helps*, published by the Public Affairs Committee, 30 Rockefeller Plaza, New York.

Included is advice to workers desiring to obtain defense jobs and to employers seeking defense workers. Employers are urged to give their local state employment office a list of job openings they have or expect to have; list requirements for jobs by occupation and skill; give the employment office a chance to refer qualified workers before advertising; and avoid soliciting workers competitively, or recruiting workers from outside the community until the local employment office has had a chance to meet their needs.

Arc Welding

(*Concluded from Page* 124)

heat treated and bent afterward, a heating operation could thus be saved. Quite frequently this can be done where heat treatment is involved.

Another item having to do with the sequence of operation and which perhaps comes into the picture more in design than in this discussion is the matter of arrangement of parts such as those indicated in Fig. 4. Here there might be four welds, one on each corner as compared to two welds down the center of a part. Also the former would be corner welds, while the latter would be butt welds.

What might be termed semi-automatic setups also offer important advantages. Here the operator sets up the part in a more or less elaborate fixture and maintains arc length during the completion of the joint using a simplified automatic control. This amounts to use of an automatic head operated under the control of an operator, usually with a rather elaborate welding fixture. Some of the considerations in reference to full automatic welding and the control problem will be considered in a later article.

It is evident that it pays to give considerable thought to this matter of handling and to speed of production past the operator. An operator can work at a much higher speed than is customarily thought if the work is properly prepared and if he has the right kind of electrode and machine plus comfortable working conditions.

Practically any combination may be worked out by keeping in mind the fact that the operator to be efficient should keep the arc going the largest possible portion of his working time and should not need to spend much time getting work to and away from his station.

Get this timely help for APPRENTICE TRAINING of Tool and Die Makers

Now widely used by many companies and trade schools throughout the U. S. Meets urgent need for a complete, up-to-date text for training, "refresher" courses, or problem solving in the tool room. The shortage of tool and die makers must be met fast by men who know the "whys" and "hows". This book gives them both and more. It shows how to select tool steel; how to make tools; how to avoid trouble; how to improve tool performance. Read on the left what others say about this modern text.

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By Frank R. Palmer
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315 pages — 205 illustrations
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Low price of $1.00 per copy makes it economical for training use. Elementary enough to meet the urgent need for a good text for apprentice training. Practical enough to be helpful in advancing the skilled tool maker. Contains hundreds of practical suggestions that can be quickly applied in daily work to get improved tool performance. Send coupon below for free descriptive leaflet, or order a book for examination.

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Supervisor Industrial Education
State of Wisconsin

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Director of Training
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. . . Simple and easy to read. Contains useful information which commends it to technical men, semi-technical men, and men in the shops who want to improve their ability to make the best use of tools.
Prof. Bradley Stoughton
Dept. of Metallurgical Engineering
Lehigh University

. . . have read and re-read the book. Became absorbed in finding out and learning so many things I never knew before. Chapter 17 on quenching is worth the price of the book . . . will need 45 copies for classroom use.
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Worcester Boys' Trade School
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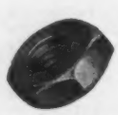

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The Garand Rifle

(*Concluded from Page* 114)

enters a recess in the tool feeding device, causing a tapered plug to spread the cutters by the desired amount of the feed.

The rifling grooves, of which there are four, have a depth of 0.004-inch and a twist of one turn in 10 inches or approximately two turns in the length of the barrel. Needless to say the barrel must have a finish of high excellence and be machined to close limits (of the order of a thousandth). As in the case of large caliber guns, the star gage is used to check bore dimensions every inch. In this case, the delicacy of touch demanded is of such a high order that a uniform spring pressure is employed to expand the measuring points in preference to the uncertainties of hand operation.

Two Barrel Checking Methods

"Chambering" or machining of the seat for the cartridge is performed in a machine of the kind shown in Fig. 23. The muzzle end of the gun barrel is held in the work spindle by a lever-operated collet chuck; while support toward the butt end is provided by an adjustable lath-type steady rest with spring-operated jaws which allow the barrel to "float" and so avoid the effects of eccentricity. The turret of this particular machine contains ten spindles (fewer may be used), each of which mounts a tool adapter fitted with nut and lock nut, the latter designed to function as a depth stop by positioning against a collar screwed on the end of the barrel.

In action, all the operator has to do is to feed in the uppermost work spindle up to the depth stop. Upon withdrawal of the spindle, the turret indexes automatically, bringing the next spindle into line for the second operation and so on until all ten tools have been successively engaged. Fig. 24 shows a set of reamers used for the 0.50-caliber machine gun barrel.

Then the barrel is straightened, a process which always has a large amount of interest for the visitor to a gun plant. Two methods of examining for out of truth may be used, namely the "line" and the "ring". In the former (which can only be used before the rifling is cut), the operator sights through the barrel at a black horizontal line on a ground glass window 20 feet away. With the eye slightly above the center of the bore the reflection of the line in the shiny interior of the barrel is observed. If the bore is straight, the reflection of the line appears like two converging railroad tracks running half way along the barrel. Any curvature or kinks in these lines indicate the necessity of applying pressure by means of the jack—the question of where, and how much, being largely a matter of experience.

In the ring test a painted glass cap having a clear ring is placed over the end of the bore. The light passing through the ring in the cap will appear in multiple reflection as a series of rings in the bore. Distortion or lack of concentricity of these rings is an index of irregularity of barrel form. Straightening in this case is done with a copper hammer. Removal of stock from a piece, especially a piece of the long slender shape of a gun barrel, tends to relieve internal stresses unequally and so causes distortion regardless of how carefully the heat treatment has been carried out.

Firing Tests: Observe the ejected cartridge flying through the air in the upper righthand corner of Fig. 25, where shooting accuracy of the completed gun is being checked. Incidentally, the angle of ejection of the cartridge case is a good indication of just how well the gun is working. If functioning at its proper speed, the case will be thrown forward at an angle of about 45 degrees.

The wood used for the stock is well-seasoned black walnut. In response to the writer's question concerning the possibility of using plastics in the event of restriction on the supply of walnut, Mr. Garand said there was no prospect of shortage, and that plastics are not satisfactory. Not being good insulators, they are cold (or hot) to the touch, give off odors, are slippery, and more expensive than wood.

Distributes Sheet and Strip Calculator

■ A revised and improved sheet and strip weight calculator that will give automatically correct weight of any sheet or strip stock relative to the piece chart weight in connection with all sheet metal requirements is being offered by Dayton Rogers Mfg. Co., Minneapolis. While it is primarily laid out for all strip and sheet steel, there is included an automatic conversion table for such materials as aluminum, copper, bronze, and other sheet alloys.

The piece part weight is recorded instantly on the unit after learning the weight of the stock, including the thickness, together with the length required. The unit will calculate sheets in width from ⅛ to 96 inches wide, in thicknesses from 0.002 to 1-inch and in length from ¼ to 1000 feet. This pocket device is being offered free on receipt of a request on a company's letterhead.

Metal Powder Conference

(*Concluded from Page* 128)

F. T. Sisco, American Institute of Mining and Metallurgical Engineers, New York, put in a word for the designers, however. He said that the fault lies with the metallurgist in not acquainting designers with factual data on powders, and hence the designer must make allowances for the "metallurgist's ignorance."

Importance of metal powders as a means of reducing scrap losses in parts was cited by Charles Hardy of Charles Hardy Inc., New York, who mentioned the specific case of a machined brass part which involved a 73 per cent scrap loss. A change to a brass powder for this part reduced the loss to about one-half of a per cent. Brass powders are reported commercially available from the New Jersey Zinc Co., New York.

In the group of papers comprising the nonferrous powder discussions were two on cemented tungsten carbides, one by M. F. Rogers of the Callite Tungsten Corp., on the effect of particle size on the microstructure of cemented tungsten carbides; the other by Dr. B. W. Engle of Carboloy Co. Inc., Detroit, dealing with physical and chemical properties of carbides after final sintering.

The mechanism of sintering was the subject of a contribution by P. E. Wretblad, Fagersta Steel Works, Sweden. P. H. Emmet of Johns Hopkins University, Baltimore, spoke on "adsorption isotherms" of fine powders. F. N. Rhines of Carnegie Institute of Technology, Pittsburgh, reported on homogenization of sintered copper-nickel alloys, and J. Kurz of the Callite Tungsten Corp. on iron-molybdenum alloys. H. Hausner and P. W. Blackburn of American Electro Metal Corp., collaborated on a paper dealing with compound contact metals.

This was the second yearly conference on powder metallurgy arranged by Professor Wulff and was adjudged by most of those present as worthy of continuation. It is planned to compile the technical presentations of both last year and this fall in book form at an early date.

Electric Wiring Manual

■ *Interior Electric Wiring and Estimating*, by Uhl-Nelson-Dunlap; cloth, 354 pages 5½ x 8¼ inches; published by American Technical Society, Chicago, for $2.50.

This is the third edition of a tested manual, revised in accordance with the newest national electrical code, adopted late in 1940. Over 50 pages of new material have been added and all illustrative problems have been gone over and revised to comply with the new code.

A new section on cable wiring has been written in a way that the beginner can learn to install this material. Instructions include wiring of old houses in which wiring had not been previously installed.

400 Shell Per Hour

(*Concluded from Page* 132)

wheel through the disk and shell into the other wheel making two welds simultaneously. Primary current to the transformer is controlled by a tube contactor and is interrupted to produce approximately 60 individual spot welds around the outer edge of the disk as it revolves under the electrode wheel.

A combination hand lever and latch not only simplifies the work of shifting the sliding fixture but also serves to index the fixture to the correct welding position. A limit switch actuated by the slide serves as a double check by preventing operation of the machine unless the fixture has indexed correctly.

Should the welding transformer become overheated for any reason such as failure to turn on the water cooling system, a thermal limit switch automatically interrupts the control circuit.

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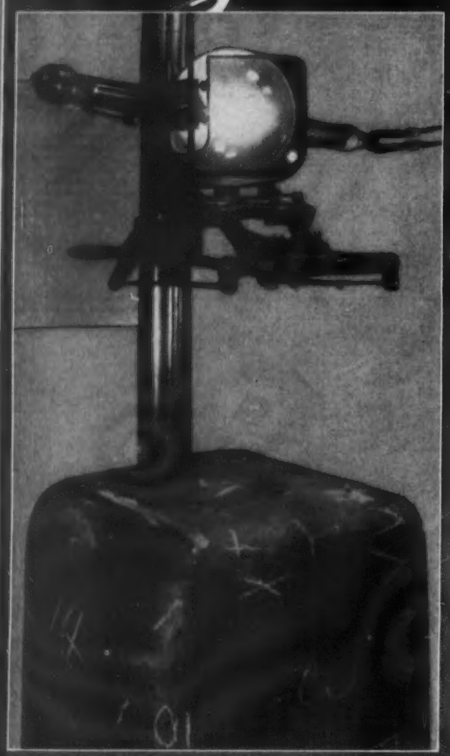

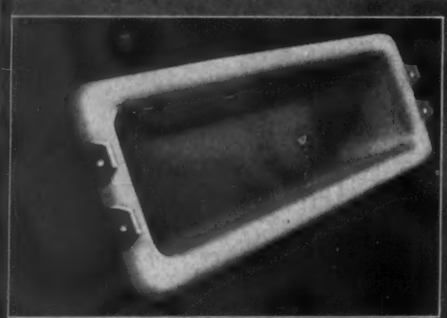

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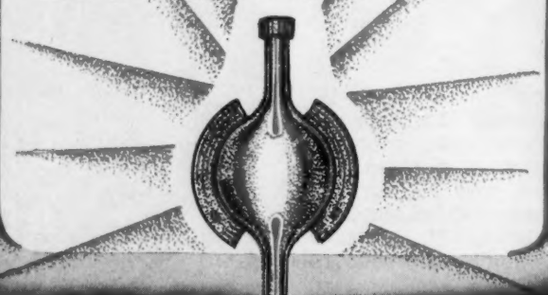

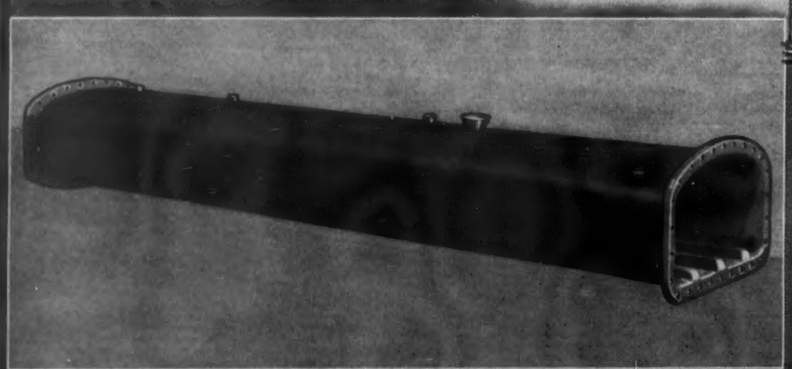

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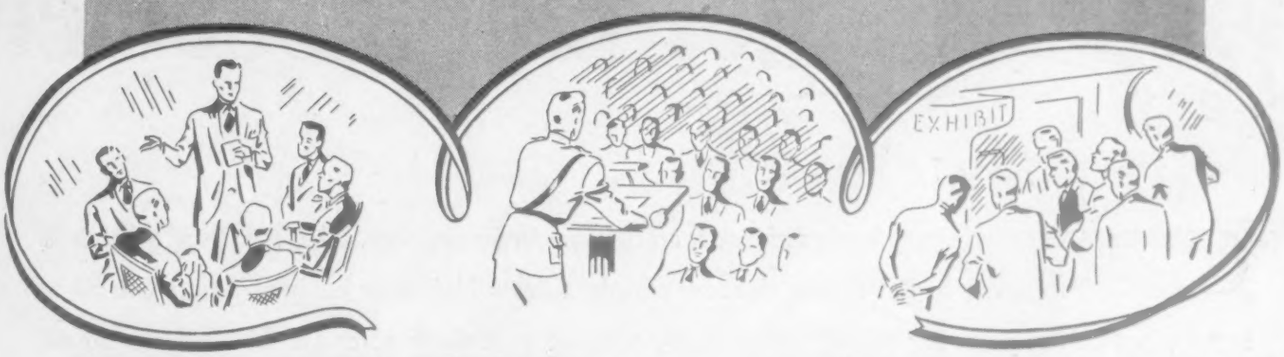

The entire metal industry is pooling its knowledge of defense production and conservation at the 1941 Metal Congress & Exposition in Philadelphia, October 20-24.

Under direct request of many manufacturers a comprehensive program of group meetings on Defense Problems, Conservation and Substitution has been prepared. These group meetings are not to be of the ordinary round-table type where everything is left to chance but are to be well-planned presentations.

A representative will present at each meeting the latest information on the scarce materials involved in the clinic and the status of substitute materials, also indicating how industry can assist in and adjust itself to the present shortages. Since meetings will be "off-the-record" men of industry will be free to discuss actual production problems and quote examples.

Subjects to be discussed include alloy steels, stainless, molybdenum, tool steels . . . alloy castings . . . bearing metals . . . shells . . . aluminum . . . magnesium . . . copper . . . inspection of metals . . . priorities, etc.

In addition to these afternoon and evening clinic meetings, more than 80 technical papers will be presented at regular annual meetings of the four technical societies who cooperate in the Metal Congress.

And—at the Metal Exposition—the exhibits of 300 leading manufacturers in the metal industry (largest show ever held) will feature the latest, most modern materials, equipment, and processes for speeding production.

Don't miss the opportunity of hearing the nation's leading defense experts in Philadelphia—your defense job demands representation at the Metal Congress & Exposition!

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OCT. 20-24

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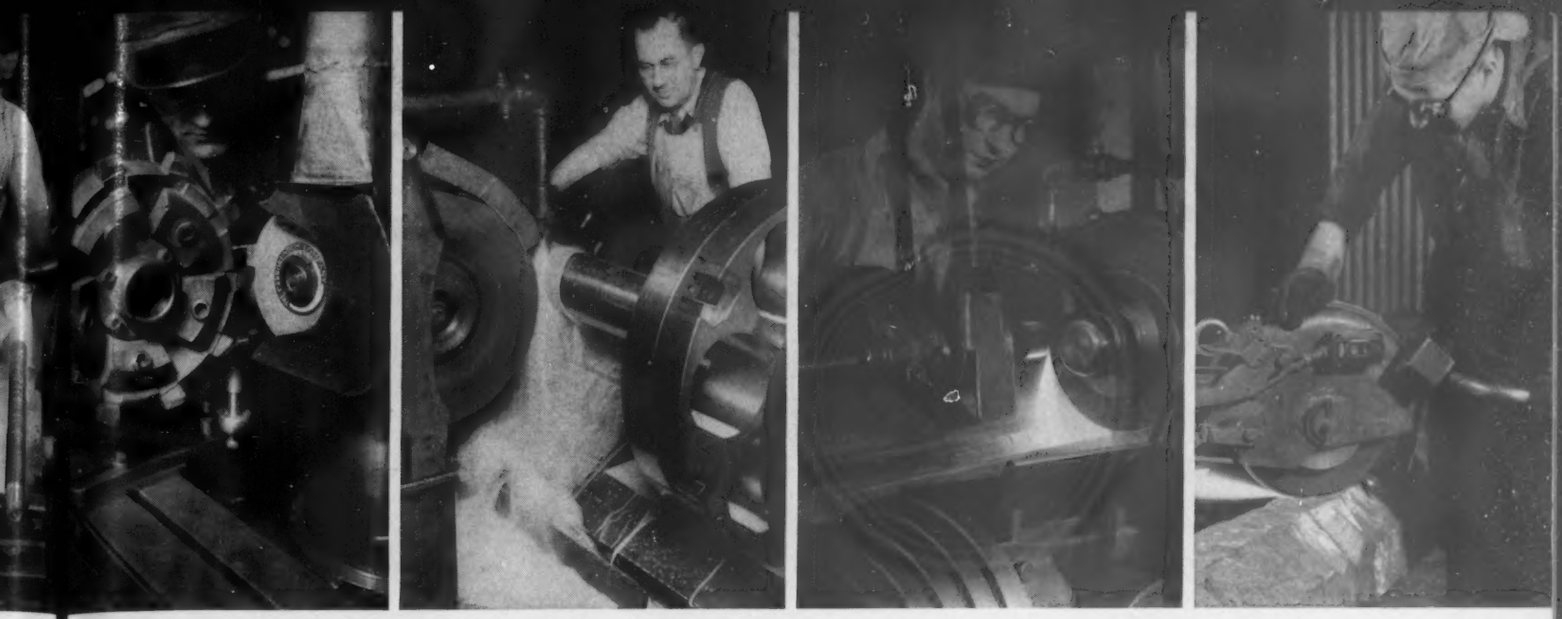

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4 MAKE SURE EACH GRINDING MACHINE IS IN GOOD CONDITION

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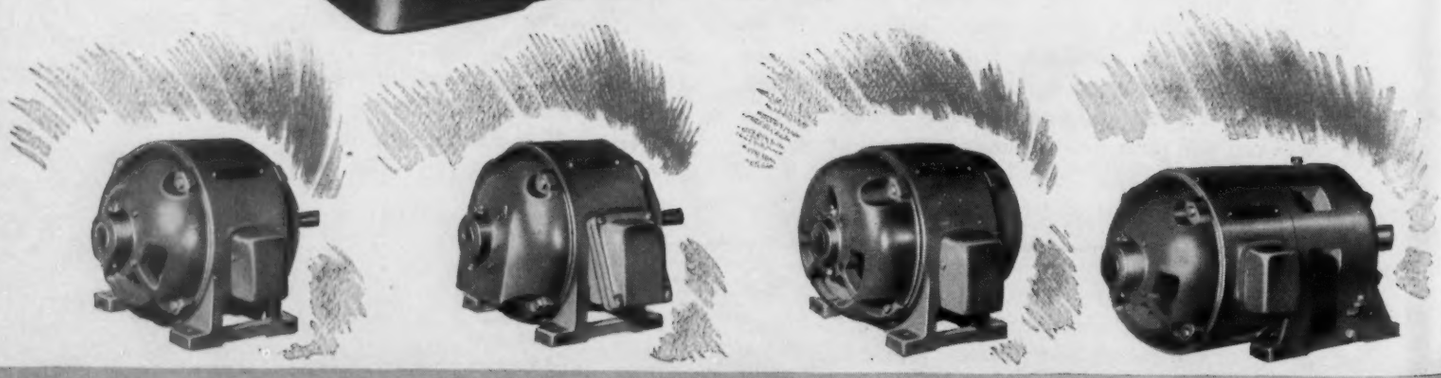

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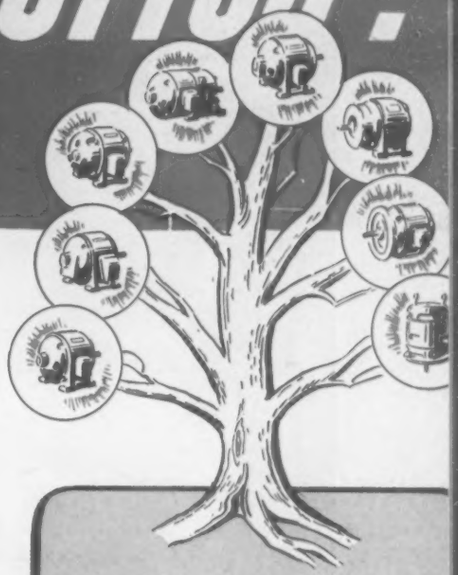

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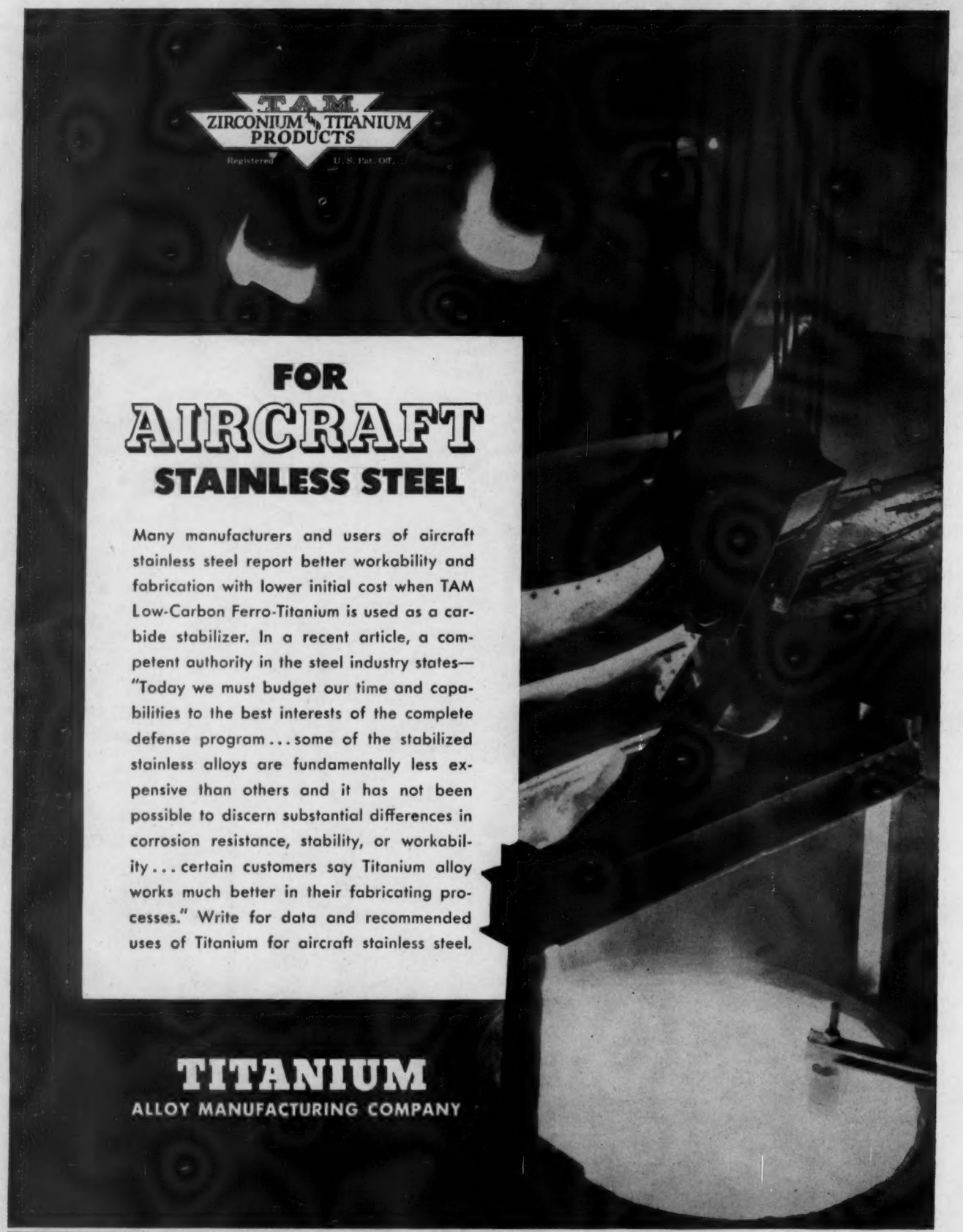
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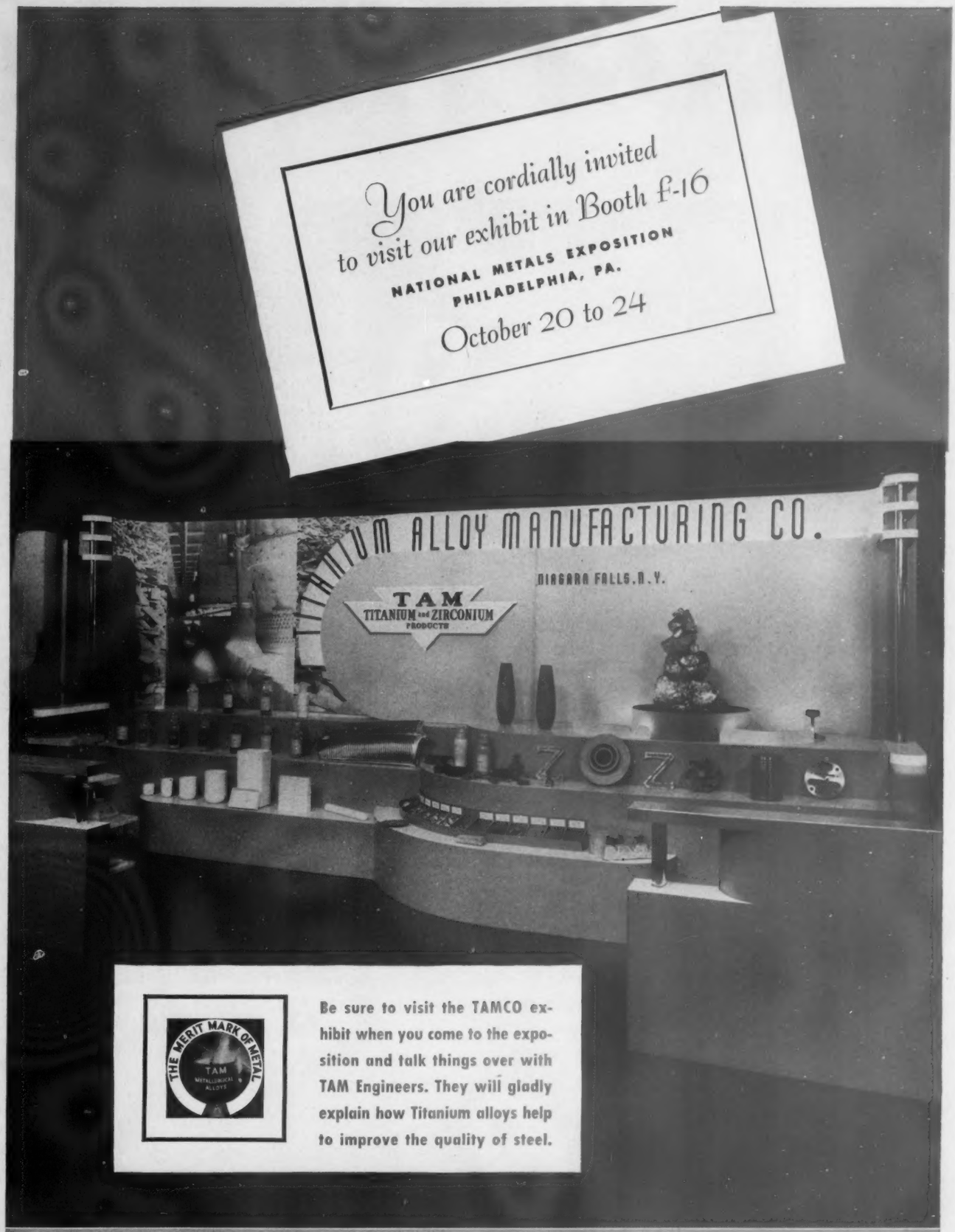
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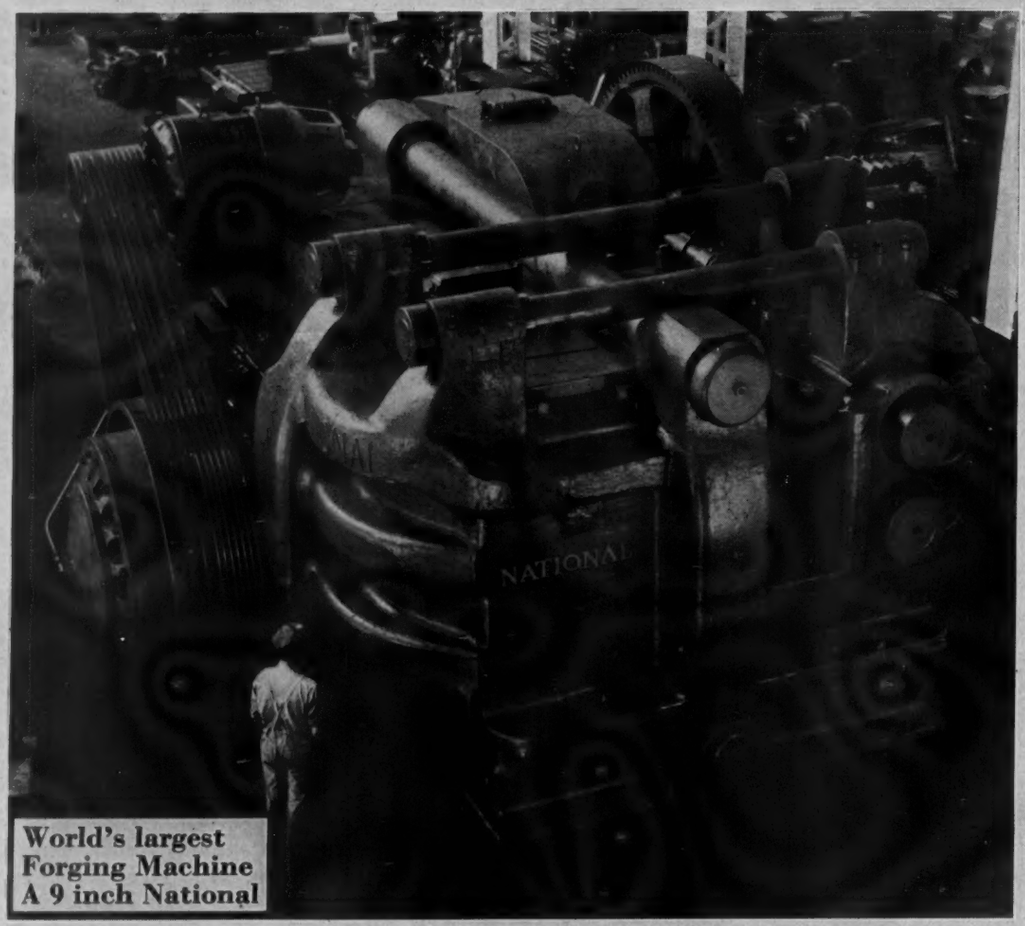
Be sure to visit the TAMCO exhibit when you come to the exposition and talk things over with TAM Engineers. They will gladly explain how Titanium alloys help to improve the quality of steel.

Representatives for the Pacific Coast . . . BALFOUR, GUTHRIE & CO., San Francisco, Los Angeles, Portland, Seattle, Tacoma

Representatives for Canada . RAILWAY & POWER ENG. CORP., Ltd., Toronto, Montreal, Hamilton, Winnipeg, Vancouver, Sydney

Representatives for Europe . . . . . T. ROWLANDS & CO., Ltd., 23-27 Broomhall St., Sheffield, England

"ENGINEERED



World's largest
Forging Machine
A 9 inch National

TO EXPERIENCED FORGEMEN, "Engineered by National" is not just a high sounding phrase. To them, it is assurance that the equipment being considered is based upon sound engineering principles. They know that National Engineering does not end in the drafting room, but also must be approved by a corps of testing engineers and prove itself in the field under actual operating conditions before being offered to the general trade.

This aggressive and sound engineering policy has resulted in National Users maintaining their "forging leadership" because they receive the benefits of the many "first features" available only in National Forging Machines.

THE NATIONAL MACHINERY Co

New York Detroit

D by NATIONAL"

EVERY IMPORTANT IMPROVEMENT since the forging machine graduated from the "upsetter" class has been originated and first used by National. Among these "firsts" are the following:

THE UNDER-SLUNG BED FRAME: Originated and first used by National in 1919. It was, and still is, the basis of the modern High Duty Forging Machine.

THE OVER-ARM HEADING SLIDE: Originated and first offered by National in 1919. This slide opened up an entirely new field of forging—deep piercing by internal displacement. At the time a few skeptics thought the idea of deep piercing so radical that they referred to it as a "stunt", but most forgemen were quick to see the possibilities and today it is standard commercial practice.

THE UNDER-ARM GRIPPING SLIDE: Originated and first offered by National in 1926. Still defies unremitting efforts at improvement.

SUSPENDED HEADING AND GRIPPING SLIDES: Originated and first offered by National in 1917. The only effective means ever devised for keeping scale and water from reaching the slide bearings.

INTERLACED TOGGLES: Originated and first offered by National in 1917. The best toggle construction available.

TANDEM-TOGGLE GRIP RELIEF: Originated and first offered by National in 1914. Nothing has since been perfected that remotely approaches it for a powerful grip with complete safety.

DOUBLE GRIPPING CAM: Originated and first offered in 1911. It is just as essential to the ultra-modern forging machine as the day it was invented.

SIDE WEDGE ADJUSTMENT: For maintaining parallelism of slide alignment. Originated 1919. All present day substitutes are impractical.

FLOATING BREAST PLATES: Originated and first offered by National in 1925. So simple and effective that there is no satisfactory substitute.

AUTOMATIC CASCADE LUBRICATION: Originated and first offered by National in 1925. Lubrication problems have not since existed on National Forging Machines.

Without these features the forging machine would still be a "stoving-up" machine for simple "upsetting" jobs. With them it is a modern Precision Machine Tool for producing low-weight, minimum-finish forgings on a mass production basis.

Buy Forging Equipment on the basis of Engineering Soundness. Specify National.

R Y COMPANY, TIFFIN, OHIO, U. S. A.

Chicago

STRAIGHTENING 2½" ARMOR PLATE

● On heavy jobs like this, Steelweld Bending Presses truly demonstrate their quality. Straightening heavy, heat-treated armor plate having a tensile strength of 170,000 pounds per square inch, requires tremendous power. Every part of the machine must be built to take it.

The machine runs continuously at 20 to 40 or more strokes per minute depending upon plate thickness. Every stroke of the ram hits at full tonnage capacity. 100 or perhaps several hundred strokes are required as condition of plate demands.

Dozens of Steelwelds have been purchased for armor plate work because production-minded executives have found they will perform month in and month out, 24 hours a day unflinchingly.

The extra heavy construction that makes Steelwelds so desirable for this work, is also advantageous for many bending and forming operations. If you work with mild steel, alloy steel, monel or other metals of high tensile strength, whether light or heavy gauge, it will pay you to check into the many possibilities of Steelweld Bending Presses.

GET THIS BOOK!

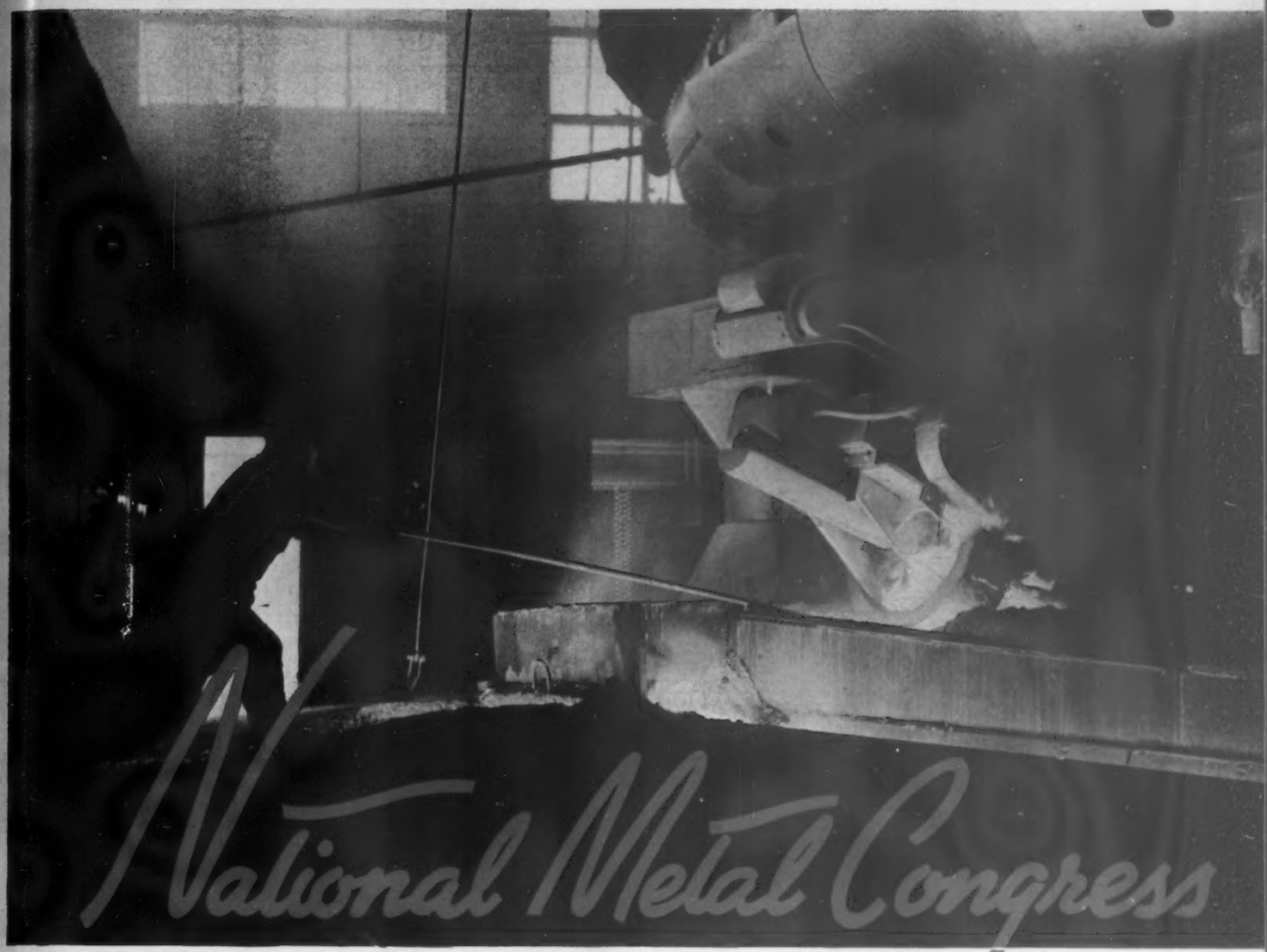
CATALOG No. 2004 gives complete construction and engineering details. Mail request

THE CLEVELAND CRANE & ENGINEERING CO.
STEELWELD MACHINERY DIVISION
1125 EAST 283RD STREET • WICKLIFFE, OHIO.

MANUFACTURERS OF ... CLEVELAND CRANES ... CLEVELAND TRAMRAIL ... STEELWELD BENDING PRESSES

STEELWELD
BENDING PRESSES

GENERAL SALES AGENTS: CYRIL BATH & CO. E. 70TH & MACHINERY AVE., CLEVELAND



OPM photo by Palmer

National Metal Congress and Exposition

Through the Exposition with STEEL 166

(A preview of the exhibits, equipment that will be seen in operation, illustrations of new and improved units that are to be shown, names and titles of the individuals scheduled to be in attendance at the exhibits)

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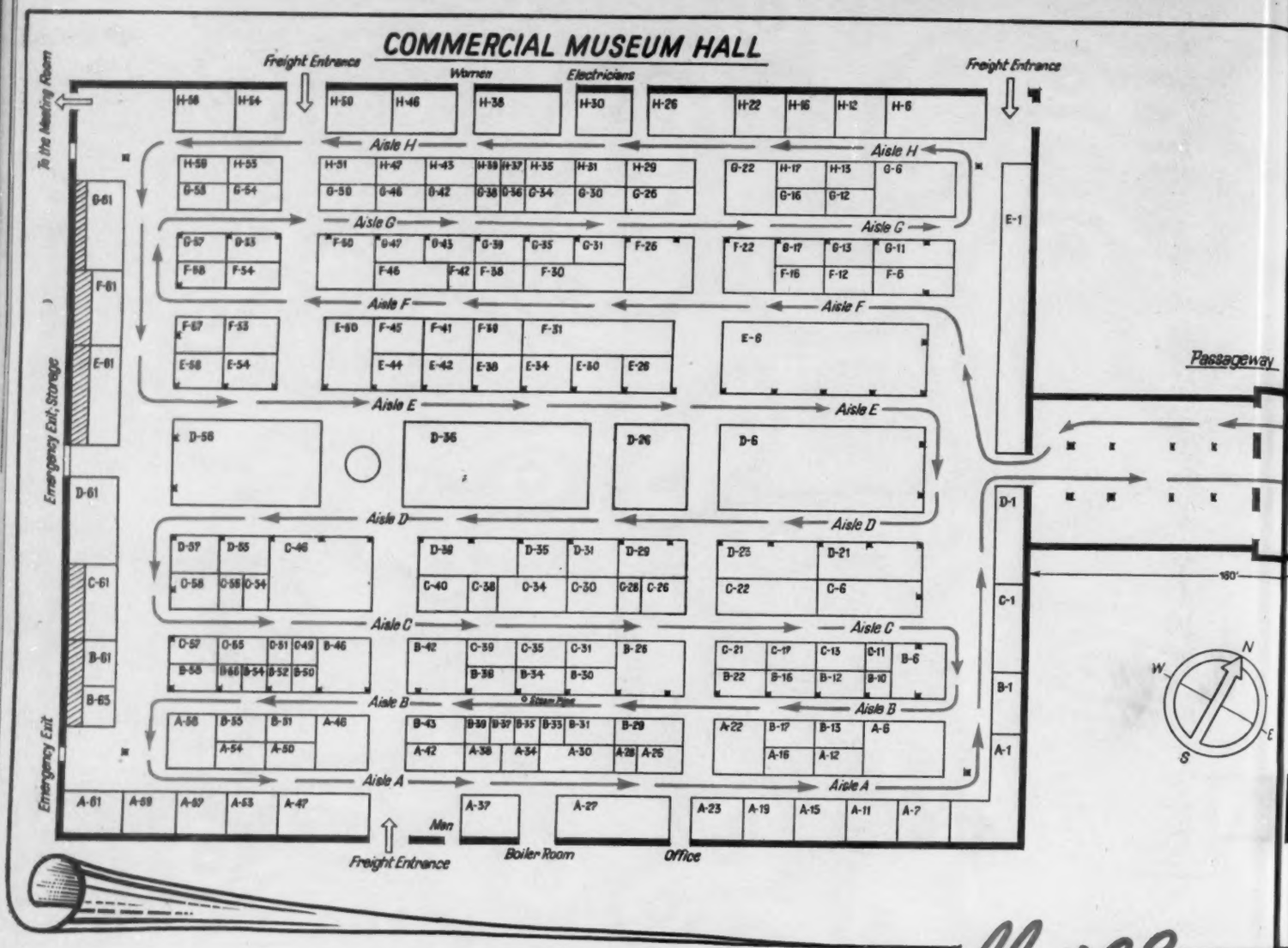
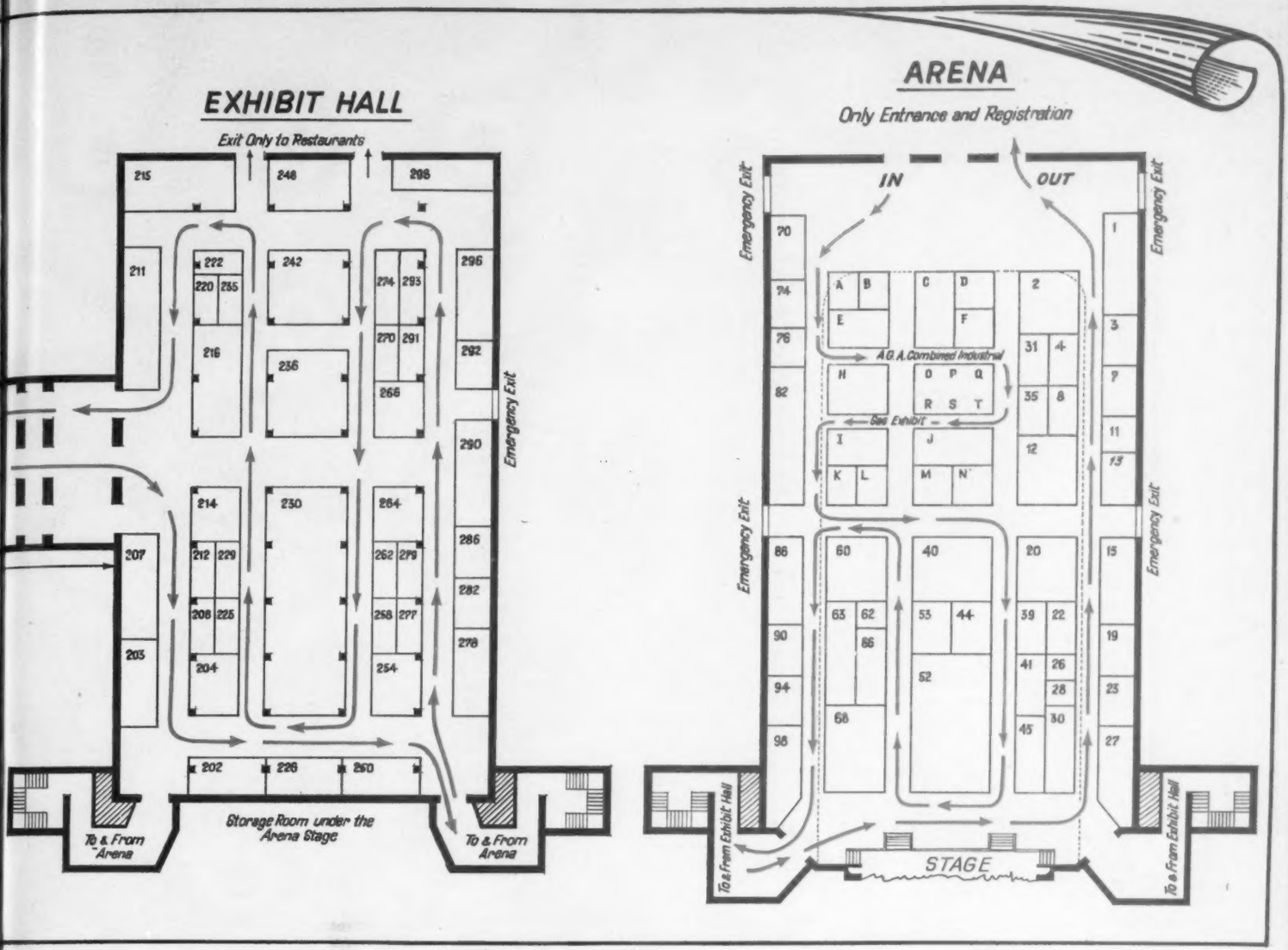


What you will see at the 1941 National Metal Exposition

In the following pages, STEEL takes you on a pictorialized trip through the 1941 National Metal Exposition to be held at Convention Hall and Commercial Museum, Philadelphia, Oct. 20, 21, 22, 23, 24. Here, in the same order as you might see them if you followed the heavy line with arrows shown on the floor plan above, you will find described and illustrated many of the latest items of equipment, materials and methods to be displayed at the show, also names of exhibitors and representatives scheduled to attend



Enter Arena

Booth No. D—R-S Products Corp., Philadelphia, will demonstrate butterfly valves and balopticon showing views of gas heat treating furnaces. Representatives: W. E. Borbonus, president; D. E. Wyman, chief engineer; D. W. Hopkins, assistant chief engineer; Earl Gorman, sales manager.

Booth No. C—American Gas Furnace Co., Elizabeth, N. J., will exhibit in operation small production reciprocating clean hardening machine and large machine of the same kind to demonstrate the size range; small appliances; burners; demonstration of glass blowing. Representatives: P. C. Osterman, vice president; E. C. Cook; G. A. F. Machlet; F. J. Schweizer; J. Mehrman; T. Farwick Sr.; W. J. Barenscheer; O. T. Muehlemeyer; S. C. Dinsmore; W. A. Stumpf; W. H. Kelsey; Porter Hurd; A. N. Mason; W. L. Speece; G. Schwab; W. E. Sturmer; H. F. Barton.

Booth No. B—Fieser-Lundt Inc., New York. No information available.

Booth No. A—Vulcan Corp. No information available.

Booth 70—Penton Publishing Co., Penton building, Cleveland, will exhibit publications—STEEL, MACHINE DESIGN, THE FOUNDRY, DAILY METAL TRADE, NEW EQUIPMENT DIGEST, and technical books. Representatives: E. L. Shaner, president and treasurer; G. O. Hays, vice president. STEEL: E. C. Kreutzberg, editor; J. D. Knox, steel plant editor; G. W. Birdsall, engineering editor; A. F. Macconochie, contributing editor; B. K. Price, associate editor; E. W. Kreutzberg, eastern manager; B. C. Snell, eastern representative; S. H. Jasper, Pittsburgh manager; R. C. Jaenke, advertising manager, STEEL; J. W. Zuber, circulation manager. DAILY METAL TRADE: I. H. Such, editor; V. W. Volk, assistant advertising manager. THE FOUNDRY: F. G. Steinebach, editor; J. F. Ahrens, eastern representative. NEW EQUIPMENT DIGEST: B. R. Baker, New York and New England manager; W. T. McCall, Philadelphia district manager; F. O. Rice, vice president. MACHINE DESIGN: K. D. Moslander, associate editor; R. H. Smith, eastern manager.

Booth No. 74—Chicago Flexible Shaft Co., Roosevelt road and Central avenue, Chicago, will exhibit photographs of Stewart installations in defense industries. Representatives: J. W. Lazear, eastern sales manager; Benjamin Sampson, Chicago sales engineer; C. E. Noble, Ohio sales engineer; J. N. Wallerius, chief engineer; D. H. Gardner, Chicago office; J. H. Mills, sales manager, furnace division; L. F. Fitzpatrick, manager, Canadian branch.

Booth No. 76—Illinois Testing Laboratories Inc., 420 North La Salle street, Chicago, will exhibit resistance thermometers and air velocity meters in operation, indicating pyrometers, temperature controllers. Representatives: J. A. Obermaier, president; M. D. Pugh, sales manager; J. H. Torrey, eastern representative.

Booth No. E—Selas Co., Erie avenue and D street, Philadelphia, will demonstrate firing with direct radiant gas heat, completely automatic flame hardening equipment; precision refractory burners; combustion control equipment; indicating flow meters for gas and air. Representatives: F. O. Hess, president; R. C. Jordan, of Pennsylvania, W. M. Smith of New York, W. D. Fuller of New England; E. A. Furkert of Mid-West, E. D. Allen of Michigan, J. Smith of Chicago, representatives; J. Kniveton, C. P. Mann, R. E. B. Wakefield, engineers; R. F. Apter, research engineer; H. W. Smith Jr.

Booth No. H—Eclipse Fuel Engineering Co., Rockford, Ill., will demonstrate gas-fired aluminum melting furnace of stationary crucible type equipped with McKee HE Entrainment burners and CS automatic air control valve; gas-fired bell-type furnace fired by McKee Wall-tite blast burners supplied by McKee LP low pressure proportional mixer; McKee centrifugal pressure-blower furnishing air supply. Representatives: G. W. McKee, vice president; K. A. Scharbau, general manager; L. J. Strohmeyer, V. C. Leatherby, sales engineers; E. A. Stoner, shop superintendent; L. B. Maximon of Philadelphia, C. C. Carmody of Pittsburgh, O. L. Maddux of New York, L. G. Webber of Boston, H. H. Etter of Connecticut, E. H. Seelbach of Buffalo, W. H. Kay of Cleveland, representatives.

Booth No. O—Ruud Mfg. Co., Pittsburgh. No information available.

Booth P—Burkay Co., Toledo, O. No information available.

What you will see

at the 1941

National Metal Exposition

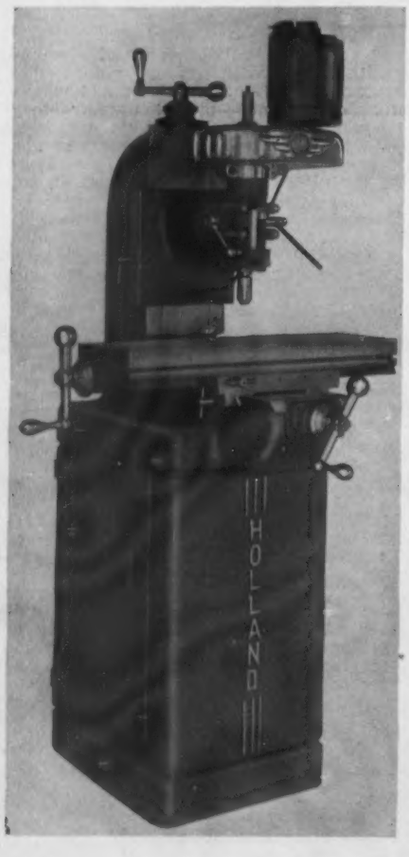
Booth No. Q—Bryant Heater Co., 2153 Prospect avenue, Cleveland. No information available.

Booth No. F—Partlow Corp., New Hartford, N. Y., will demonstrate new type of electric temperature control capable of controlling at either of two temperature settings within narrow limits; other types of temperature controls, recorders, etc., will be displayed. Representatives: H. W. Partlow, president; H. W. Partlow Jr., A. M. Stock, vice presidents; M. G. Hanley, secretary-treasurer; J. K. Clark, development engineer; A. W. Orton, factory superintendent; B. L. Finn of Chicago, O. J. Stirling of Detroit, W. H. Kay of Cleveland, G. T. Desjardins of Cincinnati, C. J. Boeringer of Pittsburgh, Porter Hurd of Philadelphia, L. G. Webber of Boston, representatives.

Booth No. 31—Automatic Temperature Control Co. Inc., 34 East Logan street, Philadelphia, is exhibiting standard, redesigned, and new valve operators, timers, temperature controls. Representatives: G. H. Johanson, president; J. D. Andrews, sales manager; J. C. Whiddett, sales department; I. G. Johanson, engineering department; R. H. Mecklenborg, exhibit manager; W. C. Bellis of New York; H. Wetter of Philadelphia; G. S. Frazee of Pittsburgh; G. Goodman of Baltimore.

Booth No. 35—Spencer Turbine Co., Hartford, Conn., will show in operation multi-stage turbo compressors and industrial type vacuum cleaners. Representatives: F. A. Wright; Frank Martin, Philadelphia representative; R. Webber; R. A. Brackett.

Booth No. T—General Gas Light Co., Kalamazoo, Mich. No information available.



New vertical milling machine for milling, drilling and boring is suitable for work on tools, dies, molds and precision production operations. High speed head is self-contained motor-driven unit, can be turned to any angle parallel with longitudinal ways. Shown by Marburg Bros. Inc., 90 West street, New York

New resistance welding control, Condens-O-Weld, contains all necessary control and protective devices to take alternating-current power from a 3-phase line, charge a condenser bank, and discharge it into a welding machine. Shown by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Booth No. S—Mears-Kane-Ofeldt Inc., Philadelphia. No information available.

Booth No. R—Sellers Engineering Co., Chicago. No information available.

Booth No. J—Surface Combustion Co., Toledo, O. No information available.

Booth No. I—C. M. Kemp Mfg. Co., Baltimore, will exhibit items essential to national defense processed with gas fuel through medium of industrial carburetor. Representatives: E. B. Dunkak, vice president and sales manager; R. S. Van Note, assistant sales manager; William Hunt, development engineer; E. W. Abrahamson, New York manager; W. H. Gibb, Philadelphia manager; W. J. Traxl, Connecticut manager.

Booth No. 82—Harnischfeger Corp., Milwaukee, will exhibit electric arc welding units and electric hoists in operation, electrodes and a gasoline-engine driven welder. Representatives: W. Harnischfeger, president; F. Salditt, H. Strouse, vice presidents; M. Rutishauser, sales manager welding division; George Drake, sales manager hoist division; E. T. Slackford, sales promotion and advertising manager; L. M. Stout of Philadelphia, C. W. Daniels of New York, A. E. Hoehler of Boston, district managers; R. M. Norton of Pittsburgh; F. J. Hirner of Chicago.

Booth K—No information available.

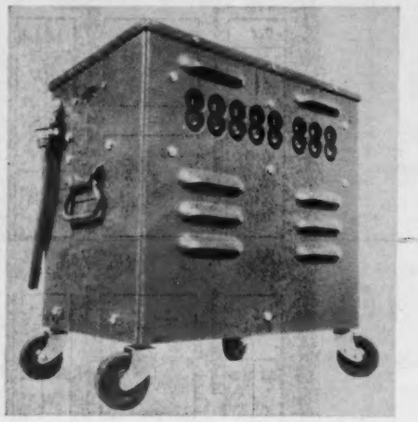
Booth No. L—Charles A. Hones Inc., Baldwin, N. Y., will demonstrate gas-fired oven furnaces, pot furnaces, industrial gas burners operating on atmospheric pressure. Representatives: C. A. Hones, president; W. R. Hones, vice president; C. J. Hones, secretary.

Booth No. M—Gehnrich & Gehnrich Inc., Woodside, L. I., New York. No information available.

Booth No. N—National Machine Works, Chicago, will demonstrate burners Nos. 89, 17, and 71 to 76 inclusive; proportional mixers, Torch Tip with electric ignition, blast line burner with electric ignition, combustion air blower; industrial gas burning equipment.

Booth No. 40—Lincoln Electric Co., 12818 Colt road, Cleveland, will exhibit new Aircraft, Shield-Arc Jr. and Shield-Arc SAE welding machines in operation and 39 different arc welding electrodes. Representatives: A. F. Davis, C. M. Taylor, vice presidents; E. W. P. Smith, consulting engineer; J. R. Morrill, assistant to the vice president; G. R. Johnson of Philadelphia, G. N. Bull of New York, district managers; L. J. Cogan Jr., W. Sivyer, H. H. Stahl, W. D. Wood Jr., E. E. Goehringer, welding engineers.

Booth No. 44—Black & Decker Mfg. Co., Towson, Md., will exhibit sanders, grinders, drills and screw drivers in operation; portable electric tools and accessories for metal. Representatives: Eric Federschmidt, manager, Philadelphia branch; Ralph Herrick and Frank Cassidy, salesmen, of Philadelphia; G. M. Buchanan, High Cycle sales engineer; J. F. Apsey Jr., advertising manager.



Booth No. 39—Metlab Co., 1000 East Mermaid lane, Philadelphia, will illustrate modern methods for heat treatment of metal parts. Evolution of steel used in aircraft construction will also be shown.

Booth No. 41—Wheelco Instruments Co., Harrison and Peoria streets, Chicago, will exhibit new flush mounted Capacitrol, portable potentiometer, surface temperature pyrometer, program controller, combination Therm-otrol-Flame-otrol, Heat Eye (radiation head), Limitrol; remote controller and Flame-otrol will be demonstrated. Representatives: J. F. Wade, Philadelphia office; D. A. Campbell, J. A. Ariano, New York office; G. W. Hall, Boston office; R. A. Schoenfeld, vice president and sales manager; T. A. Cohen, vice president and chief engineer.

Booth No. 45—Tinnerman Products Inc., 2038 Fulton road, Cleveland, will exhibit Speed nuts and Speed clips and assemblies using them. Representatives: A. H. Tinnerman, president; W. M. Buttriss, advertising manager; C. H. Judd, aviation engineer; A. G. Brenneis, manager New York office.

Booth No. 52—Aluminum Co. of America, Gulf building, Pittsburgh (subsidiaries: American Magnesium Corp., 2210 Harvard avenue, Cleveland; Aluminum Ore Co., East St. Louis, Ill.) will exhibit Alorco activated alumina and apparatus employing it; information booths on processing aluminum. Representatives: F. L. Gemmer; members of research and technical staffs.

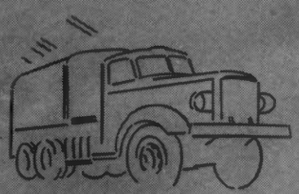
Booth No. 53—Wilson Mechanical Instrument Co. Inc., 383 Concord avenue, New York, will demonstrate rockwell hardness tester, superficial hardness tester, and motorized hardness tester and accessories; Tukon tester and Knoop indentor will be shown. Representatives:

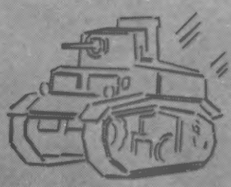
Speed those Defense Orders

WITH THE

Speed Nut System

(PATENTED)





THE FASTEST THING IN FASTENINGS

Cuts number of parts in Half

Applied in ¼ the time...

Whether you are manufacturing aircraft, tanks, troop transports, trucks or any part of a Defense mechanism involving assembly—we can help you.

How? By making drastic reduction in assembly time, reducing weight and giving you a double spring-tension lock that has defied vibration loosening even in most severe aircraft tests.

SPEED NUTS and SPEED CLIPS are manufactured in over 800 shapes and sizes. They do fastening jobs never done before and with their lightning speed of application, they can help you speed those Defense orders, saving steel, labor and time. Millions are going out daily. Send us your assembly details and we will mail samples and engineering data promptly.

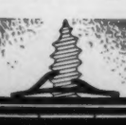
See us at the Natl. Metal Congress, Oct. 20-24, at Convention Hall, Philadelphia. Booth 45—the Arena.

TINNERMAN PRODUCTS, INC. 2039 FULTON ROAD, CLEVELAND, OHIO

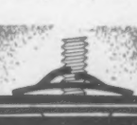
Manufacturers of Patented SPEED NUTS

IN CANADA: Wallace Barnes Co., Ltd., Hamilton, Ont.

IN ENGLAND: Simmonds Aerocessories, Ltd., London



OVER A BILLION IN USE—OVER 800 SHAPES AND SIZES



Part of display of Elastic Stop nuts, units now widely used in aircraft wing and fuselage sections as well as many other joining applications. Shown by Elastic Stop Nut Corp., 2330 Vauxhall road, Union, N. J.

V. E. Lysaght, sales manager; E. H. Enberg, sales engineer; D. F. Sklar, development engineer; R. B. Coleman of Philadelphia; J. B. Verrier of New York; S. P. Rockwell of New England.

Booth No. 66—Bristol Co., Waterbury, Conn., will exhibit control instruments for high and low temperatures with a Pyromaster time-temperature controller on a furnace. Representatives: L. G. Bean, vice president and general sales manager; H. E. Beane, field sales manager; C. W. Bristol, chief engineer; R. M. Walker, manager field engineering department; F. W. Borchers of Philadelphia, L. E. Mustard of Detroit, C. Webber of New York, G. H. Gaites of Pittsburgh, F. J. Reynolds of New England, district managers.

Booth No. 62—Alox Corporation, Niagara Falls, N. Y., will exhibit corrosion preventive compounds and petroleum acids. Humidity cabinets in operation will show resistance of films to penetration. Representatives: W. H. Clark, president; Dr. A. W. Burwell, vice president; J. E. Shields, research and sales engineer; H. F. Brewer, eastern manager of sales; B. G. Spice, midwest manager of sales.

Booth No. 60—E. F. Houghton & Co., Philadelphia, will exhibit rust preventive and protective coatings, Hy-Ten core oils, straight and soluble cutting oils, hot forging agents, solid and liquid carburizers, lubricants, finished products. Representatives: G. W. Pressell, executive vice president; E. C. Barlow, assistant director of sales; H. E. Sanson, sales manager, Eastern Division; James McElgin, manager metal technical sales; R. M. Quintenz, technical sales department; C. H. Stonerod, R. W. Richmond, R. J. McCormack, J. A. Patch, S. T. Dolan, R. L. Wickes, G. W. Esau, S. D. Margerum, O. H. McClay, C. E. Kite, J. F. Weber, R. J. Swing, J. R. Clendenning, F. J. Ramsey, sales representatives.

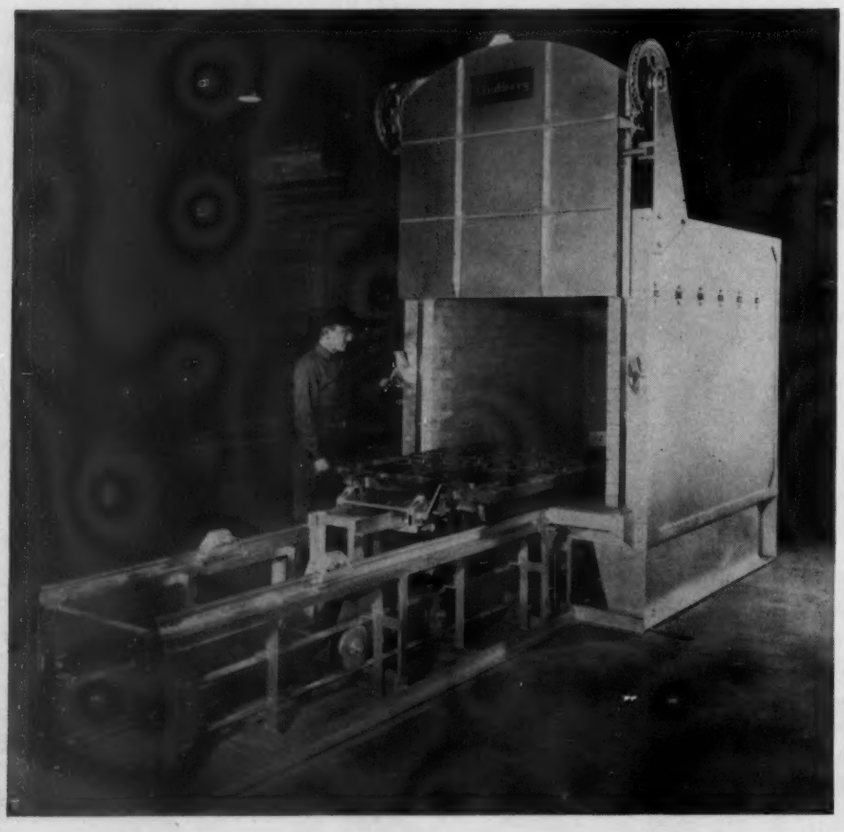
Booth No. 86—Allis-Chalmers Mfg. Co., Milwaukee, will demonstrate new Regulex exciter and show other products. Representatives: R. W. Davis, assistant manager; A. H. Wyman and others from Cleveland; H. W. Bartling, T. B. Montgomery, H. D. Timm, E. H. Frederick, electrical department, Milwaukee; and others.

Booth No. 63—Minneapolis-Honeywell Regulator Co., Brown Instrument Co., Division, Philadelphia, will exhibit indicating, recording and controlling instruments including the new continuous balance circular chart potentiometer. Representatives: E. B. Evleth, vice president and general manager; L. M. Morley, vice president and general sales manager; K. R. Knoblauch, assistant general sales manager; J. R. Green, manager, and J. E. MacConville, Steel Division; H. M. Schmitt, Philadelphia industrial manager; J. R. Simpson Jr.; G. H. Larkin; L. J. Benson; A. Potts; O. B. Pyle; W. J. Brosch; R. Schlegel; R. S. Ferguson.

Booth No. 90—Electro Manganese Corp., Rand tower, Minneapolis, will exhibit high purity manganese and maintain reception booth with educational exhibit. Representatives: K. M. Leute, president; W. W. Osborne, secretary-treasurer; W. L. Hammerquist, research engineer; R. P. Dunn, research metallurgist.

Booth No. 94—Franklin Institute, Philadelphia, will have educational exhibit.

New roller grid Cyclone furnace for heat treatment of aluminum permits speeding quenching. Work sets on grid pulled in and out of furnace by a carriage, in turn operated by an air cylinder. High-velocity air quickly heats work. Electric heaters in separate chamber allow heater units to be changed in 10 minutes without cooling furnace, also prevent hot spots from direct radiation. Shown by Lindberg Engineering Co., 221 North Laflin street, Chicago



Booth No. 68—Lindberg Engineering Co., 221 North Laflin street, Chicago, will exhibit new roller grid Cyclone furnace for heat treatment of aluminum and transparent Cyclone tempering furnace with fan operating. Representatives: L. A. Lindberg, C. H. Stevenson, F. A. Hansen, vice presidents; L. W. Remiker, engineering; L. C. Koenig, production; N. K. Koebel, research director; R. S. Aitchison, D. W. Johnson, advertising; L. A. Shea, R. C. Onan, W. R. Smith, Chicago sales; L. W. Hayden, C. F. Burling, New York sales; J. S. Ayling, C. D. Critzer, Cleveland sales; E. N. Metz, Cal Stevens, St. Louis sales; F. C. Condit, Detroit sales; H. O. Munn, Buffalo sales; R. W. Stahl, Indianapolis sales; W. J. Parsons, Los Angeles sales.

Booth No. 98—Firth-Sterling Steel Co., McKeesport, Pa., will exhibit new and standard sintered carbide lathe tools, milling cutters, end mills, boring tools, counterbores, drills, reamers, tipped gages, sintered carbide dies and mandrels, Cromovan dies. Representatives: D. G. Clark, vice president; A. B. Corbin, sales manager; R. T. Riffle, advertising manager; O. K. Parmiter, metallurgist; G. W. Frick Jr., manager Firthite Division; M. F. Judkins, Firthite engineer; A. R. Zapp, manager Firthaloy Division; H. I. Moore of Hartford, O. T. Smith of Boston, A. E. Barker of New York, G. A. Jacobs of Detroit, E. T. Jackman of Chicago, H. P. Jaeger of Cleveland, district managers.

Leave Arena—Enter Exhibit Hall

VISIT OUR FREE *Abrasion Clinic*

AT THE NATIONAL METAL SHOW

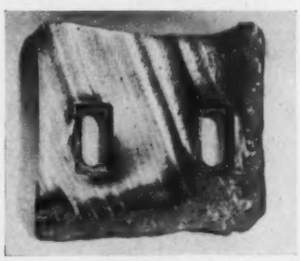
Bring those short lived pieces of equipment that have been crippling your production schedule and causing all the headaches in the maintenance department to the National Metal Show at Philadelphia. Stoody Company is sending a staff of hard-facing M. D.'s to diagnose your abrasion problems, perform autopsies on worn equipment, and prescribe the type of hard-facing medicines needed to prolong equipment life, reduce operating costs, and speed defense production.

The clinic will be open the entire week. Why not make it a point to attend? Remember the address—Stoody Company, Space E-61, Philadelphia Public Auditoriums. The time—October 22 to 27.

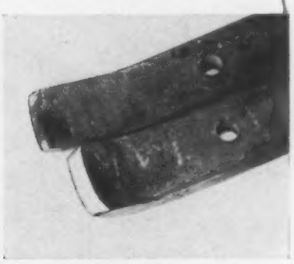
STOODY CATALOG NO 106 STOODY STOODY COMPANY WHITTIER CALIFORNIA

Stoody Hard-Facing Alloys are described in Catalog No. 106. Send for your copy now!

Rx: Apply Stoody Hard-Facing Alloys to all wearing surfaces

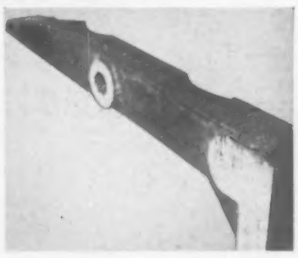


MULLER PLOWS—"We had thirty hours to live...then one day Stoody physicians prescribed a diet of Borod and Cobalt Borium. Since then, my brother and I have lived *ten times* longer than expected, thanks to the Stoody treatment!"



DITCHER TOOTH—"My future was none too bright. I faced early extraction. But as a last resort, wear vitamins of Tube Borium were tried ... today, I'm still sharp as a tack and 1¼" longer than my worn out neighbor here who went to work the same day I did!"

ROCKER ARM—"When the Stoody hard-facing M.D.'s came along, I was one out of hundreds on the junk pile. But Stoodite surgery and a grinding treatment put us all back to work again ... better than new!"



SIDE GUARD—"Gall trouble nearly ruined me...my work suffered terribly. But after just one application of Stoodite I improved immediately. Now I'm able to do 8 times more work than before...without galling finished products!"

STOODY COMPANY, 1134 West Slauson Avenue, Whittier, California

STOODY COMPANY *Hard Facing Alloys*

Precast insulating panel permits quick assembly into furnace structures simply by inserting the necessary fastening bolts. Shown by Quigley Co., 56 West Forty-fifth street, New York

Enter Exhibit Hall

Booth No. 254—Carpenter Steel Co., Reading, Pa., will exhibit Magic Selector for choosing tool steels. Representatives: J. H. Parker, president; F. R. Palmer, vice president; B. H. De Long, chief metallurgist, G. V. Luerssen, metallurgist; P. B. Greenawald, metallurgical engineer; O. V. Greene assistant metallurgist; W. H. Kemper, George Brumbach, S. M. Heck, Walter Schlegel, metallurgical department; A. E. Keller, advertising manager; H. B. Gaylord; V. B. Fisher; N. C. Einwechter; W. O. Steele; Richard Evans; Richard Calvert.

Booth No. 278—American Brass Co., Waterbury, Conn., will exhibit copper and copper alloy parts and products; in operation will be oxyacetylene and electric arc welding equipment using copper and copper alloy rods. Representatives: W. Harold Dowd and others.

Booth No. 277—Tinius Olsen Testing Machine Co., 500 North Twelfth street, Philadelphia, will demonstrate new impact machine, universal testing machine, dynamic balancing machine, proving ring and instruments. Representatives: B. L. Lewis; G. C. Lawrie; E. Jacobsen; E. M. Redstreake; T. L. Richards; T. Y. Olsen, president; Tinius Olsen II, vice president.

Booth No. 282—Detroit Rex Products Co., Detroit. No information available.

Booth No. 279—Park Chemical Co., Military and Vancouver avenues, Detroit, will exhibit operating induction furnace salt bath, new non-burning carburizer, and standard carburizer. Representatives: W. P. Woodside, president; J. N. Bourg, vice president and general manager; H. I. Dixon, assistant general manager; J. P. Clark of Pennsylvania, F. J. Staral of Indiana, W. P. Woodside Jr. of Ohio, F. W. Faery Jr. of Michigan, R. N. Lynch of Michigan, J. C. Thompson of Illinois, sales engineers; R. W. Luzius, grain cement sales engineer.

Booth No. 286—Federal Products Corp., Providence, R. I. No information available.

Booth No. 290—Norton Co., Worcester, Mass., will exhibit grinding wheels and refractories. Representatives: W. R. Moore, general sales manager; W. T. Montague, assistant vice president; G. A. Park, eastern sales manager; Robert Kirkpatrick, sales manager, Refractories Division; A. G. Green, chief sales engineer; V. H. Ericson, sales engineering department; A. Seymour, district manager, Philadelphia office; W. J. Bell; H. C. Steele; F. E. Leiby; C. W. Jinnette; A. W. Gough; J. D. Laughrey; W. A. McCune Jr.; C. M. Nyden.

Booth No. 266—Phillips Mfg. Co., 340 West Huron street, Chicago, will show in operation portable Phill-Co degreasers. Representatives: W. D. Phillips, president; J. M. Bash, secretary-treasurer; Dr. E. Atherton, research engineer; R. A. Van Fossen, chief engineer.

Booth No. 292—Tide Water Associated Oil Co., Eastern Division, 17 Battery Place, New York, will exhibit industrial lubricants including Tycol sulphurized cutting oils and soluble cutting oils. Representatives: H. G. Mullen, industrial sales manager; W. B. Joachim, Territorial sales manager; Walter Sauer, industrial advertising manager; F. W. Hallam, cutting oil engineer.

Booth No. 291—Physicists Research Co., Ann Arbor, Mich., will demonstrate Type P portable profilometer, Type I tracer and Type U Mototrace. Representatives: E. J. Abbott, president; D. E. Williamson, physicist; J. R. Wieneke, W. Dietiker, profilometer division.

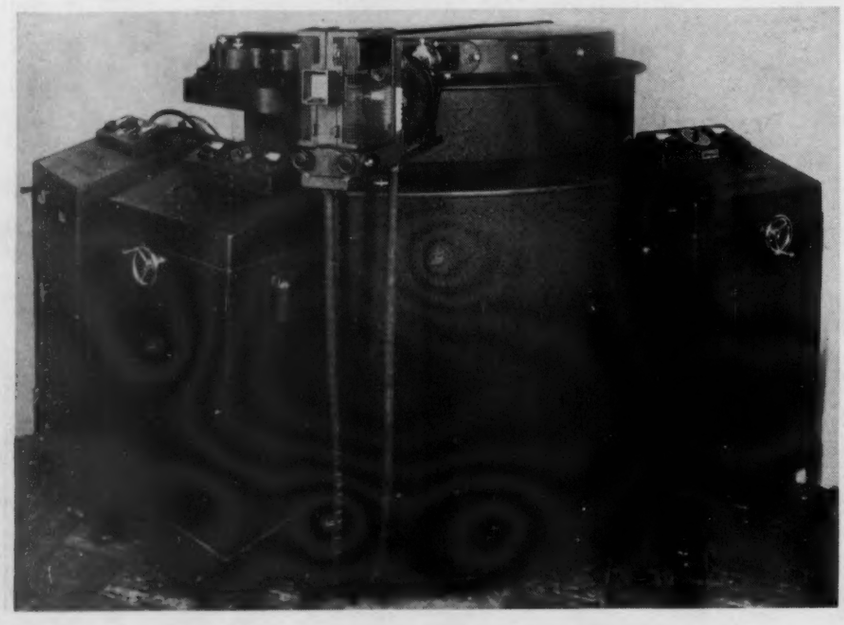
Booth No. 296—Iron Age, 100 East Forty-second street, New York, will exhibit publications. Representatives: J. H. Van Deventer, president and editor; C. S. Baur, vice president and general manager; Emerson Findley; R. F. Blair; B. L. Herman; H. K. Hottenstein; H. E. Leonard; Peirce Lewis; C. H. Ober; W. B. Robinson; W. J. Fitzgerald; D. C. Warren; O. L. Johnson; B. H. Hayes; R. E. Baur; C. N. Baur; A. H. Dix; T. W. Lippert; W. A. Phair; F. J. Oliver; T. C. Campbell.

Booth No. 293—American Institute of Mining and Metallurgical Engineers, 29 West Thirty-ninth street, New York, will sponsor an educational exhibit showing role of important metals in defense during World wars I and II. Representatives: F. T. Sisco, assistant secretary; H. A. Maloney, assistant treasurer.

Booth No. 298—Steel Founders' Society of America, Midland Bank building, Cleveland, will sponsor booth containing exhibits of: Adirondack Foundries & Steel Co. Inc., Watervliet, N. Y.; General Steel Castings Corp., Eddystone, Pa.; Deemer Steel Casting Co., Newcastle, Del.; American Steel Castings Co., Newark; Empire Steel Castings Inc., Reading, Pa.; Malleable Iron Fittings Co., Branford, Conn.; Penn Steel Castings Co., Chester, Pa.; Lebanon Steel Foundry Co., Lebanon, Pa.; Hunt-Spiller Mfg. Corp., Boston; Treadwell Engineering Co., Easton, Pa.; Vulcan Iron Works, Wilkes-Barre, Pa.; Pennsylvania Electric Steel Casting Co. Hamburg, Pa.; Atlantic Steel Castings Co., Chester, Pa.; Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.; Reading Steel Casting Division, American Chain & Cable Co. Inc., Reading, Pa.; Farrel-Birmingham Co. Inc., Ansonia, Conn.; Hartford Electric Steel Corp., Hartford, Conn.; Crucible Steel Casting Co., Lansdowne, Pa.; Dodge Steel Co., Philadelphia.

Booth No. 248—Revere Copper & Brass Co. Inc., 230 Park avenue, New York, will show production steps of products and finished products, and will demonstrate production of extruded hinge butts and making of chain mesh from strip

New Arl-Dietert spectrograph handles qualitative and quantitative analyses of all metals. Concentration of the element may now be as high as 20 per cent, permitting analysis of stainless and many other high-alloy steels. Shown by Harry W. Dietert Co., 9330 Roselawn avenue, Detroit



DoAll "SHORT CUT" Metal Worker

Rush that job!
Holding up production waiting for it!
Every day is costing us money!

—When customers write and wire like that, it's high time to get a DoAll, today's greatest time saver in metal working plants everywhere.

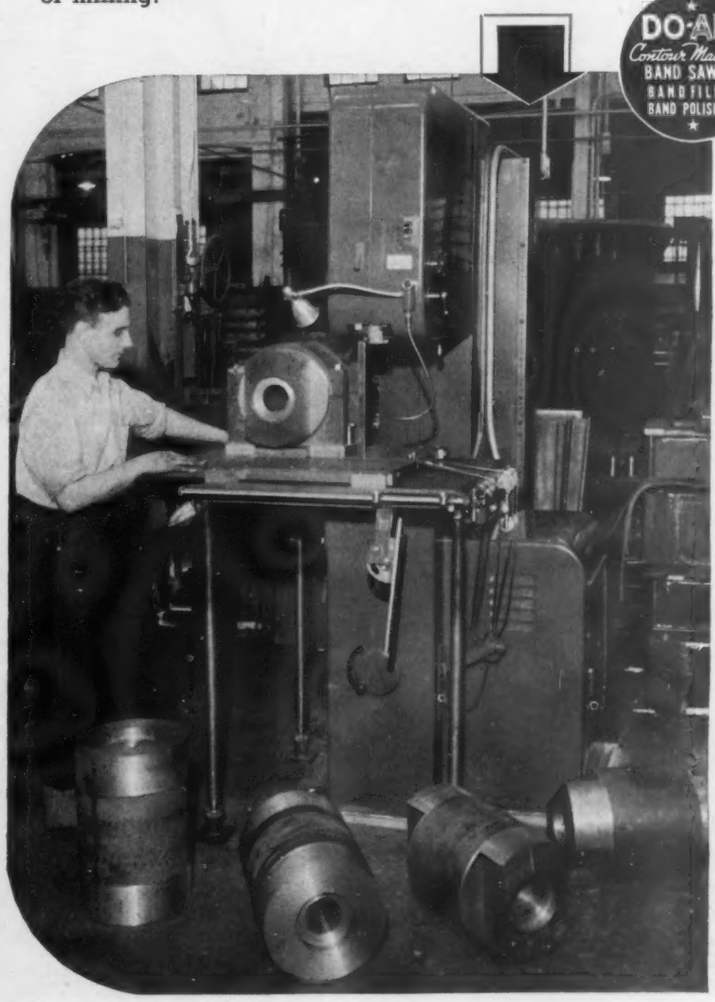
1/8 FORMER TIME

Connecting Rods for Diesel Engines made in less than 1 hour each at Sumner Iron Works, Everett, Wash. Former time—8 hours each.

★ ★ ★

1/3 FORMER TIME

Wrist pins for Diesel Engines made from 45 carbon steel in 2 hours, 48 minutes each at Norberg Mfg. Co., Milwaukee, Wis. Former time—8 hours of milling.



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This wonder worker in metal saves so much time, effort, temper and material that you can't afford to be without it—not if you use metal or alloys.

Takes the place of shaping, milling and lathe work on hundreds of jobs. Makes special parts, large or small, without dies. Cuts out 40 to 60 shapes at one time by stacking the sheets one above the other.

LET'S GET TOGETHER

We will send a factory trained man to your plant with a DoAll to show you what it can save for you. Just say the word.

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Associated with the DoAll Company, Des Plaines, Ill., Manufacturers of Band Saws and Band Files for DoAll Contour Machines.

See our Exhibit at the National Metal Congress, Philadelphia, Oct. 20 to 24th

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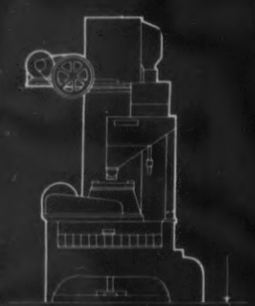
TO BLAST CLEAN ALL METAL PARTS



ROTOBLAST *leads attack on scale, burnt sand and dirt, etc.*

Pangborn Airless Barrels, Tables and Special Machines clean castings and metal parts in from 40 to 60 per cent less time—with fewer rejects—with a new low for breakage—and with such a new saving in cleaning costs that often the equipment is paid for OUT OF SAVINGS in as little as one year's time.

IF YOU HAVE BLAST CLEANING OR DUST CONTROL PROBLEMS that require careful consideration and solution—BRING THEM TO US AT THE PHILADELPHIA NATIONAL METAL CONGRESS AND EXPOSITION—October 20 to 24. We'll be there with a typical Pangborn exhibit—with a variety of Pangborn operating equipment including new size ROTOBLAST Barrel and Tables and Dust Collectors. Also a typical Pangborn Blast Cabinet for cleaning Shells. We look forward to seeing you.

NEW ROTOBLAST TABLE BULLETIN NOW AVAILABLE

• Just received from the printer. Shows new 4 foot Multiple Spindle *(Illustrated above)* and all other sizes and types. Also many special installations.

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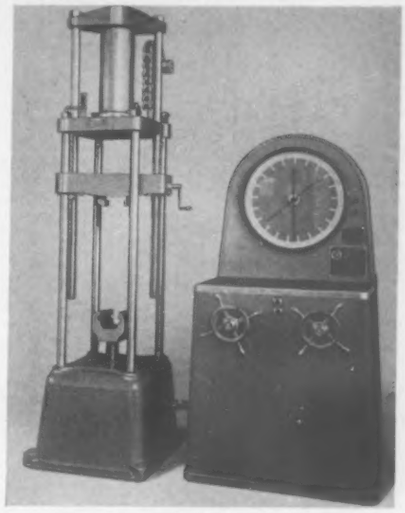
WORLD'S LARGEST MANUFACTURERS OF BLAST CLEANING AND DUST COLLECTING EQUIPMENT

PANGBORN

PANGBORN CORPORATION • • • HAGERSTOWN, MD.



New Southwark-Tate-Emery Model 60-35 Universal testing machine. Load and power units are separate. Shown by Baldwin Southwark Division, Baldwin Locomotive Works, Eddystone, Pa.

metal. Representatives: R. C. Dalzell of Baltimore, G. A. Waterman of Dallas, C. H. Kuthe of Michigan, L. E. Gibbs of Rome; E. S. Norris of Taunton, L. J. Galbreath of New York, technical advisors; F. F. Poland, supervisor industrial promotion, E. S. Bunn, assistant director of research, Rome, N. Y.; J. H. Feldman, W. Rehberger Jr., assistant sales managers, Baltimore Division; R. A. Smith, district manager, D. Hickman, assistant district manager, Philadelphia office; P. S. Lippold and W. J. Tanseer of Philadelphia office, B. M. Neilson, A. J. Newman and A. A. Utara of Baltimore Division, sales representatives.

Booth No. 242—Sciaky Corp., 11001 Cottage Grove avenue, Chicago, will exhibit resistance spot welders in operation; current rectifiers. Representatives: Maurice Sciaky, managing director; Robert Santini, installation engineer; Maurice Partiot, president, Specialty Equipment & Machinery Co., Sciaky Corp.'s eastern representatives.

Booth No. 274—Macklin Co., Jackson, Mich., will exhibit grinding wheels. Representatives: B. F. McIntyre; C. W. Gellinger; Ward Reid; E. E. Halladay.

Booth No. 270—American Car & Foundry Co., 30 Church street, New York, will exhibit in operation type C 1-electrode horizontal heater, fully automatic 1-electrode metal heater and 2-electrode rivet heater. Representatives: F. C. Cheston, sales agent; H. C. Cheston, Detroit sales agent; W. J. Bisset.

Booth No. 236—Carborundum Co., Niagara Falls, N. Y., will exhibit abrasive and refractory products. Representatives (Grinding Wheel Division): F. J. Tone Jr., S. F. Courter, B. H. Work, W. J. Griffith, A. H. Prey, H. J. Wills, C. L. Hall, H. L. Henszey, E. C. Maguire, Paul Raguse; (Refractory Division): F. W. Miller, J. G. Fritzinger, J. A. King, R. A. Barr, C. E. Hawke, A. A. Turner; ("Globar" Division): B. A. Bovee, K. E. Rogers, C. E. Barba.

Booth No. 264—Ohio Crankshaft Co., 6600 Clement avenue, Cleveland, will present new 2-station Tocco Junior electric induction unit.

Booth No. 262—Marburg Brothers Inc., 90 West street, New York (Moore Special Tool Co., Bridgeport, Conn.), will show in operation new Holland high-speed vertical milling machine, Moore precision jig borer and grinder, Duplex die and punch filing machine, Lacey die set machine. Representatives: L. C. Marburg, secretary and treasurer; Richard Krause, sales engineer; O. C. Mueller; R. F. Moore, president Moore Special Tool Co., and J. R. Moore, manager Jig Borer Division.

Booth No. 258—Harry W. Dietert Co., 9330 Roselawn avenue, Detroit, will exhibit spectro-chemical equipment for qualitative and quantitative analysis of ferrous and nonferrous metals. In operation will be sand testing equipment, Carbon Determinator and Sulphur Determinator. Representatives: H. W. Dietert, president; Dr. H. S. Read, J. A. Schuch, spectrographers; E. E. Woodliff, sales engineer; Carl King, electrical engineer.

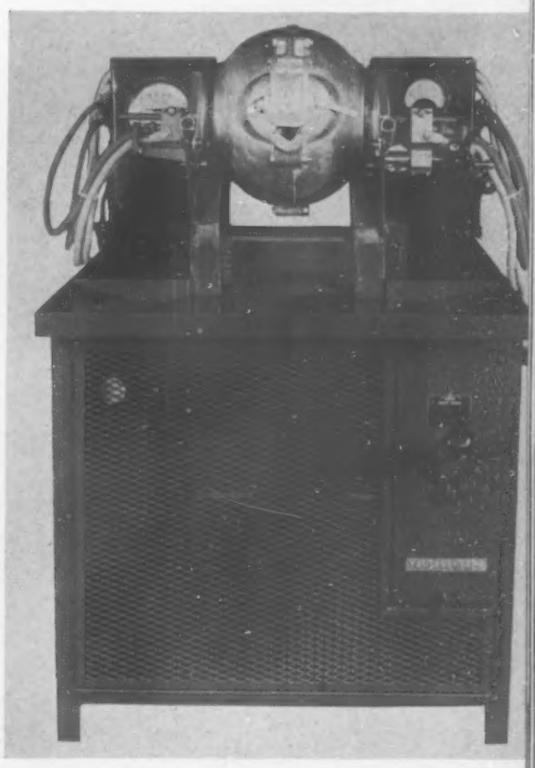
Booth No. 230—General Electric Co., Schenectady, N. Y. (General Electric X-Ray Corp., 2012 Jackson boulevard, Chicago), will exhibit model theater for "House of Magic" demonstrations. In five booths outside will be demonstrations of gas carburizing furnace, box-type furnace with drycolene-producing unit; Tri-Clad motor and Formex wire; welders. X-ray diffraction unit will be exhibited with diffraction tubes, cameras and other accessories. Representatives (General Electric Co.): C. I. MacGuffie; B. C. Tracey; C. L. Ipsen; H. M. Webber; (General Electric X-Ray Corp.): E. W. Page, manager industrial sales.

Booth No. 225—C. J. Tagliabue Mfg. Co., Brooklyn, N. Y., will exhibit new Celectray proportioning controller for throttling fuel heat.

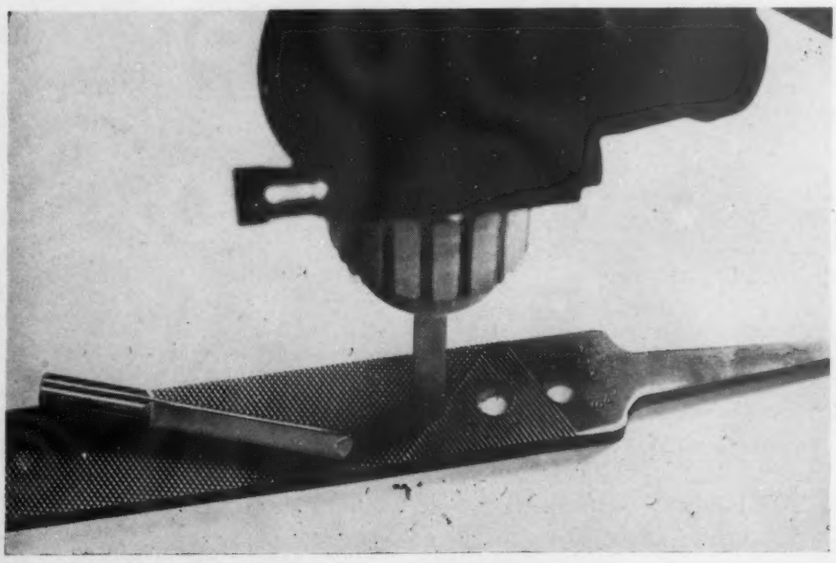
Booth No. 229—Lepel High Frequency Laboratories Inc., New York. No information available.

Booth No. 214—Driver-Harris Co., Harrison, N. J., will exhibit heat and corrosion resisting alloys. Representatives:

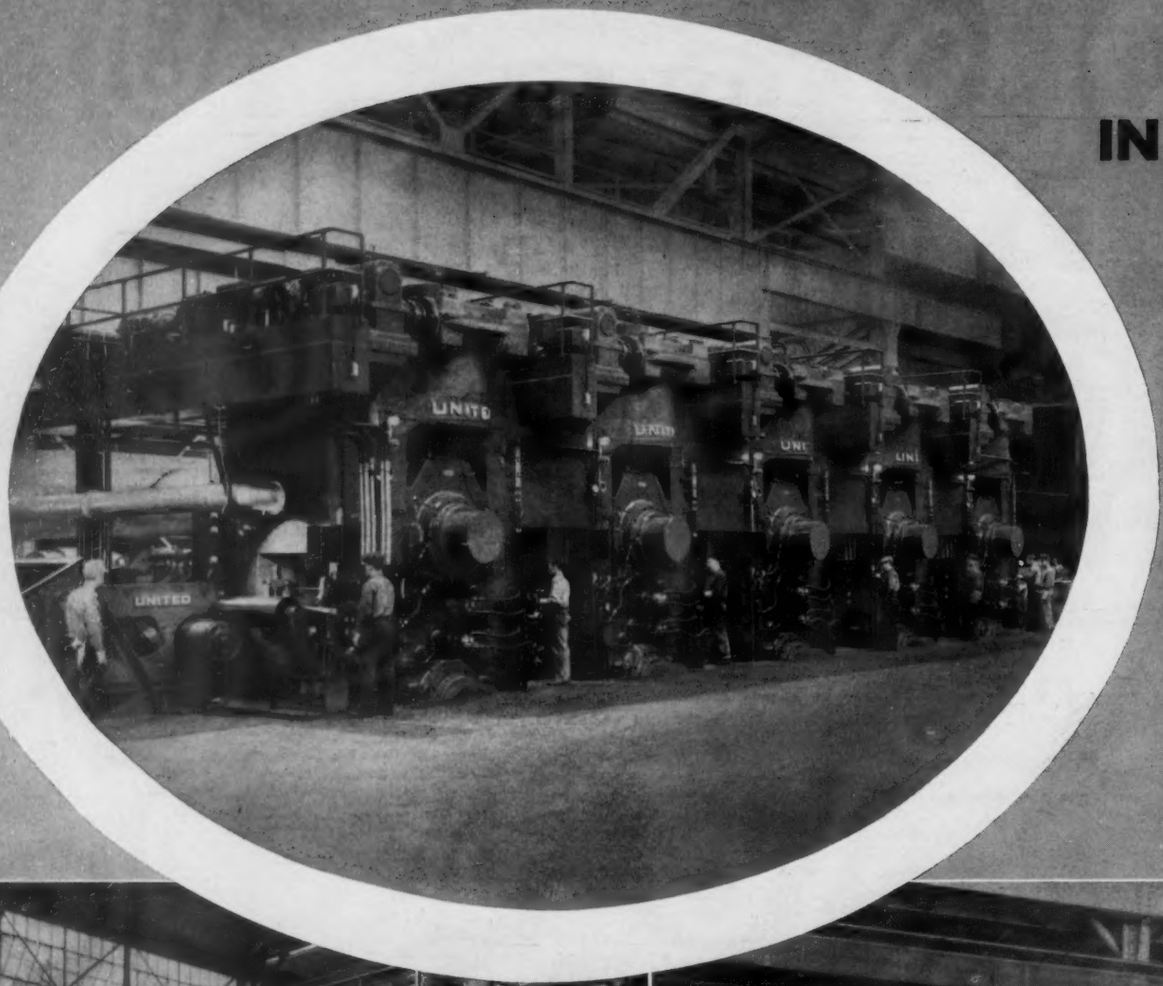
Right—
First showing of this new, laboratory, Type N, 10 kilowatt, 10 pound, Detroit electric melting furnace will be at the 1941 National Metals Exposition. Made by Kuhlman Electric Co., Bay City, Mich.



Left—
New drill for hardened steel is shown being demonstrated by boring through a file. Shape of this unusual drill can be seen by unit lying on file. Shown by Black Drill Co., 5005 Euclid avenue, Cleveland



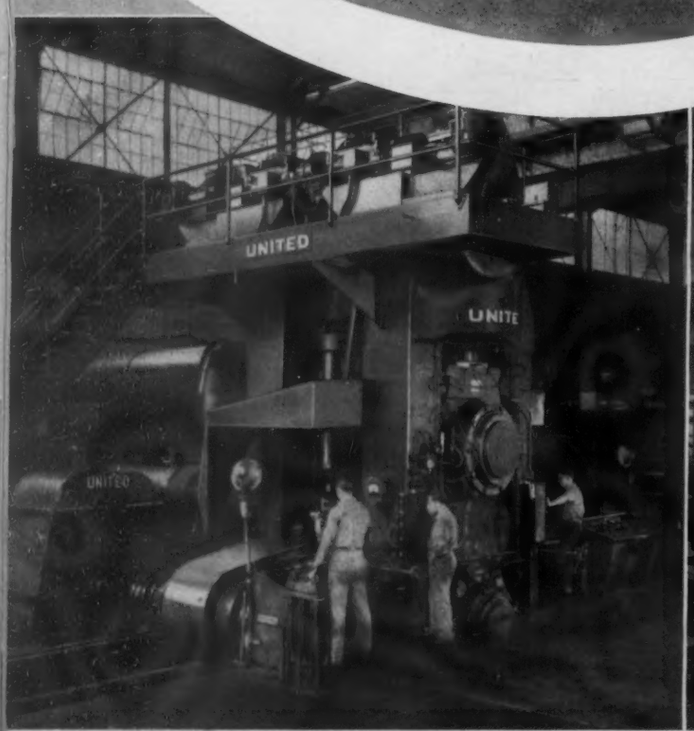
UNITED

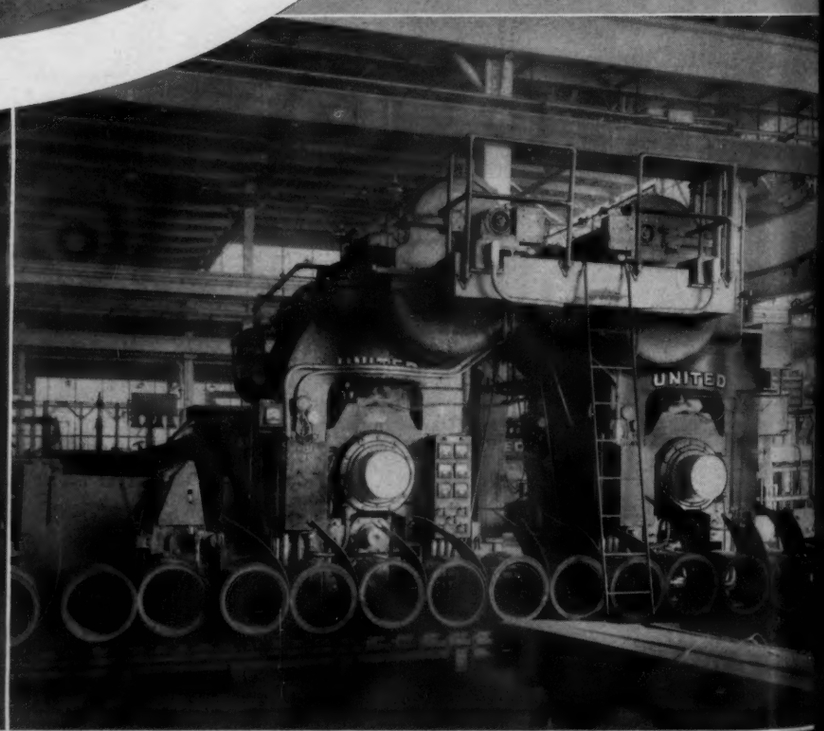


IN ALL TYPES

SINGLE STAND
TANDEM
REVERSING, ETC.

For Steel, Alloy Steels, Tinplate, Copper, Aluminum, and Other Non-Ferrous Metals

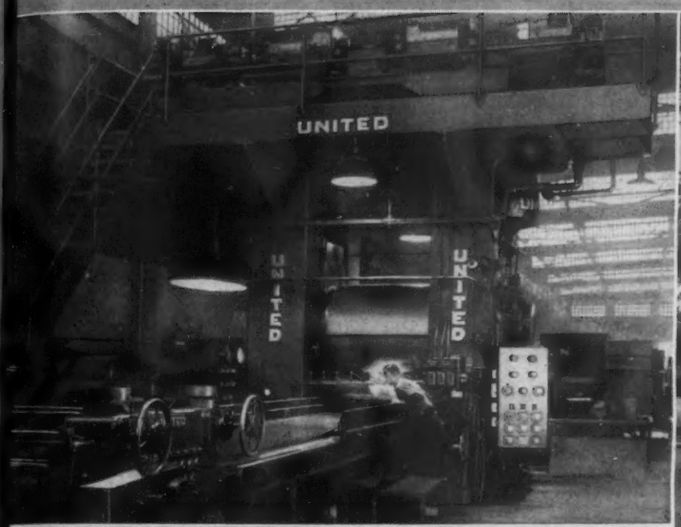


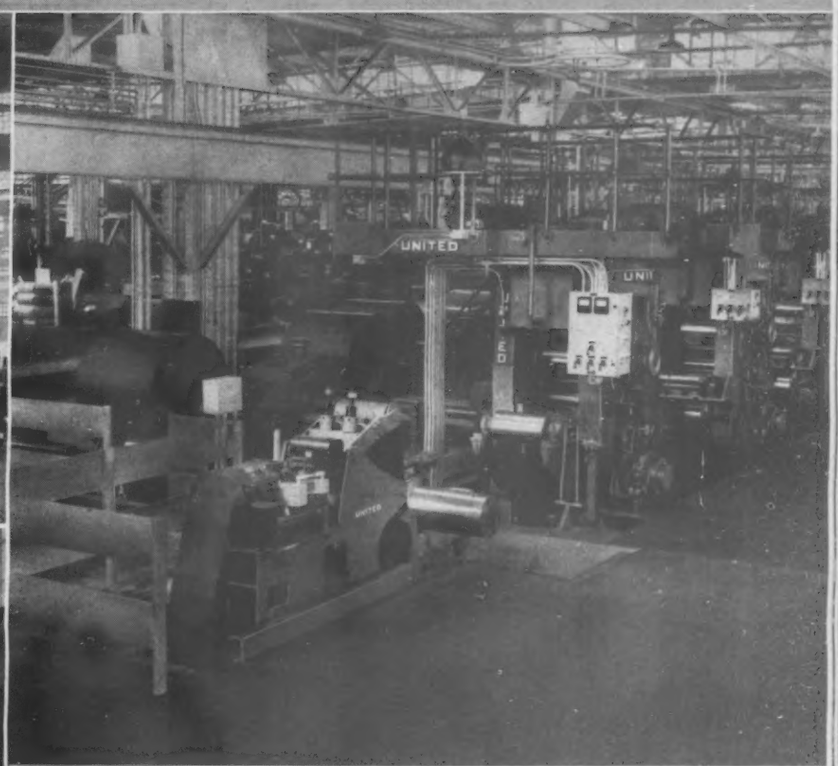


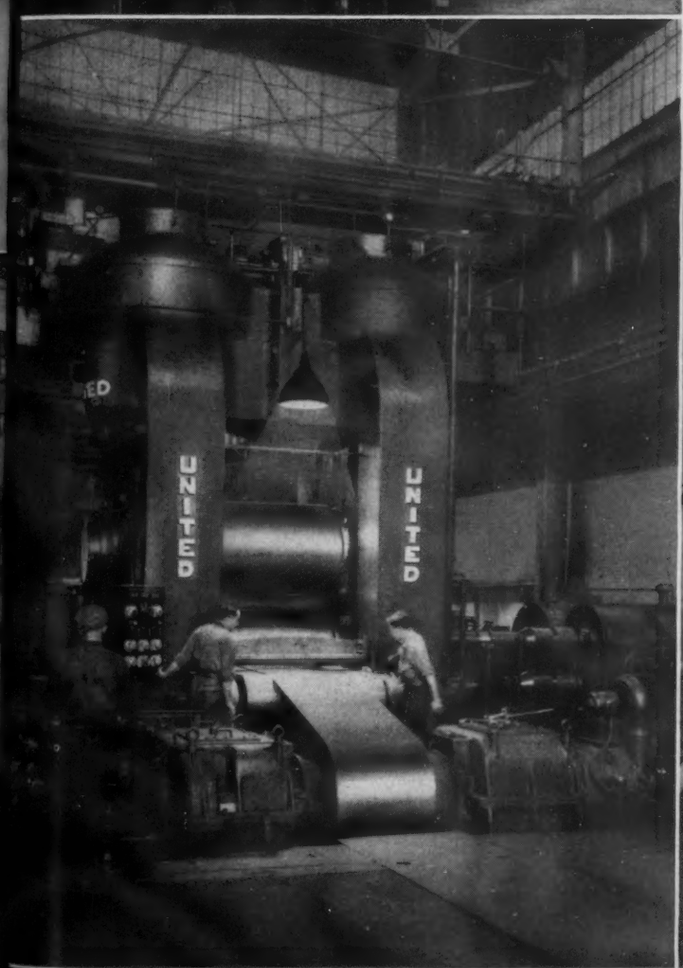
UNITED ENGINEERING *and* FOUNDRY COMPANY

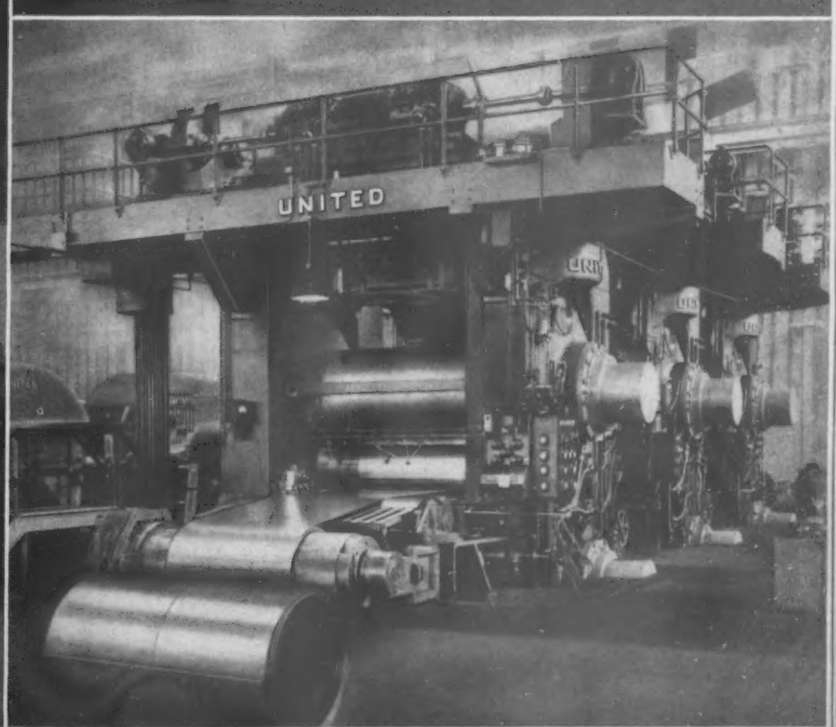
Pittsburgh, Pennsylvania

COLD REDUCTION MILLS









DAVY AND UNITED ENGINEERING COMPANY, LTD., SHEFFIELD, ENGLAND · DOMINION ENGINEERING WORKS, LTD., MONTREAL, P. Q. · UNITED INTERNATIONAL, S. A. PARIS, FRANCE · SHIBAURA-UNITED ENGINEERING CO., TOKYO, JAPAN

F. V. Lindsey, vice president and general sales manager; G. A. Lennox, assistant general sales manager; H. O. Hartdegen; W. E. Blythe, A. J. Eckley of Detroit; K. H. Hobbie of Chicago; A. H. Kromminga, New England representative.

Booth No. 216—Jones & Laughlin Steel Corp., American Iron & Steel Works, Pittsburgh, will exhibit steel ingot and tell its story. Colored photographs of steel operations will be shown. Representatives: V. A. Jevon, assistant to vice president sales; R. T. Rowles, W. H. Wiewel, assistant general managers of sales; A. A. Wagner of hot rolled products, J. W. Robinson of bar sales, A. J. Hazlett of sheet and strip sales, C. F. Goldcamp of cold finish sales, J. E. Timberlake of wire sales, sales managers; H. W. Graham, director of metallurgy and research; C. C. Henning, general metallurgist; Dr. H. K. Work, manager of research development; R. M. Gibbs, advertising manager; J. A. Needham; L. T. Willison; R. Shearer; Y. J. Bruce; E. K. Waldschmidt; A. M. Reeder; D. T. Rogers; C. L. Kent; S. L. Case; J. H. Flaugherty; C. M. Lichy; C. F. Allison; L. Van Ormer; C. W. Garret; G. L. Bond.

Booth 235—No information available.

Booth No. 222—H & H Research Co., 12540 Twelfth street, Detroit, will exhibit in operation electric portable multipurpose tools. Representatives: I. J. Turnbull, president; W. M. Smith, vice president and secretary; N. H. Huntley, vice president; A. M. Jerolamon, shop superintendent.

Booth No. 215—American Society for Metals, 7301 Euclid avenue, Cleveland, will sponsor an educational exhibit including map showing society chapters, dioramas showing early methods of making and forging metal, metallurgical books and magazines. Representatives: W. H. Eisenman, secretary; R. T. Bayless, assistant secretary; J. E. Donnellan, secretary, Metals Handbook committee; E. E. Thum, editor, *Metal Progress;* Carl Ohlson, assistant treasurer; C. L. Wells, eastern representative; R. G. Byrne, advertising and promotion department; A. P. Ford, western representative; members of Philadelphia chapter.

Booth No. 220—Central Screw Co., 3501 Shields avenue, Chicago, will exhibit a complete line of fastening devices including new self-locking nut. Representative: E. Payne, sales manager.

Booth No. 211—Ajax Metal Co., 50 Richmond street, Philadelphia, (subsidiary, Ajax Electric Co. Inc., Frankford avenue and Allen street, Philadelphia) will exhibit in operation a 15-kilowatt Ajax-Hultgren electric salt bath furnace and samples of work processed in this type of furnace; (subsidiary, Ajax Electrothermic Corp., Trenton, N. J.) alloy and weldable carbon steel centrifugal castings, high-explosive shell and forgings, brazed parts, samples of products made in Ajax furnaces; improved equipment includes coreless induction melting and heating furnaces. Representatives (Ajax Electric Co. Inc); Dr. G. H. Clamer, president; William Adam, vice president; J. E. Haig, secretary; L. B. Rosseau, district sales manager; H. L. Edsall, advertising manager; A. A. Anderson and E. E. Bolds, Cleveland representatives; Ben L. Crew and Schuyler Yates, Chicago representatives; J. E. Bullock, Detroit representative; J. S. Isdale, Connecticut representative; R. H. Perry, Buffalo representative; L. C. Pelkus, Boston representative; George Masing and E. G. Chambers, Indiana representatives; (Ajax Electrothermic Corp.) Dr. G. H. Clamer, president; R. N. Blakeslee, vice president; A. D. Meyer, treasurer; F. T. Chesnut, secretary; G. F. Applegate, production engineer; H. G. Remmers, assistant sales manager; H. L. Edsall, advertising manager; T. R. Kennedy, research engineer; V. S. Wagner, sales engineer.

Leave Exhibit Hall

Enter Museum Hall

Booth No. E-1—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., will present new Condens-O-Weld capacitor-discharge resistance welding control, standard alternating and direct-current welders, electrodes, transformers, portable switchboard to measure volts, amperes and power factor, mill motor. Ignitron rectifier, Precipitron, phos-copper brazing will be demonstrated. Representatives: L. M. Gumm, manager steel mill,

This battery of Ajax-Northrup 960-cycle induction heaters at Frankford Arsenal, Philadelphia, heats bars for forging into shell. Similar installations are now at work on 5-inch as well as 90, 105 and 155-millimeter shell. Shown by Ajax Electrothermic Corp., a division of The Ajax Metal Co., Philadelphia

SPRAYING *is an effective and quick method of applying NO-OX-ID to parts presenting rough or irregular surfaces.*

DIPPING, *cold or hot method, is employed for the complete coverage application of NO-OX-ID under many conditions.*

STOP RUSTING *of finished parts*

Machined parts, engine blocks, gears, pinions, crank shafts, steel shapes, shafting, finished bar stock, and other parts which are to be stored or shipped will not rust or lose their bright finish when sprayed, dipped, or brushed with NO-OX-ID.

Available in many consistencies . . . some provide an oil finish of excellent lubricating qualities, others set to dry wax-like finish. All can be easily removed when required. Write for information on specific grades to meet your requirements.

TWO-WAY PROTECTION
NO-OX-ID furnishes thorough chemical as well as mechanical protection.

EASY TO APPLY
Can be dipped, sprayed, or hand brushed without special equipment.

NO-OX-ID
IRON + TRADE MARK = RUST
The Original Rust Preventive

DEARBORN CHEMICAL COMPANY
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metal working and mining sections; W. W. Reddie, sales, welding section; W. R. Bernardi, manager welding sales; J. H. Germany, manager heating sections; J. F. Kelly, in charge of special alloy sales; H. R. Meyer, manager renewal parts section; E. H. Vedder, manager electronic control section.

Booth No. F-6—Lee Wilson Sales Corp., 1368 Blount, Cleveland, will exhibit in operation newly developed rotating radiant tube furnace for heating cylindrical objects. Representatives: Lee Wilson, president; J. C. Woodson, general manager; C. F. Olmstead, manager of sales and engineering; C. H. Carpenter, chief engineer.

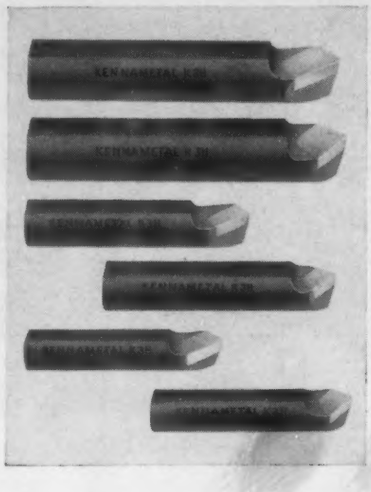
Booth No. F-12—Foxboro Co., Foxboro, Mass., will demonstrate indicating, recording and automatic controlling pyrometers including pneumatic and electric types. Representatives: S. C. Horn, E. S. Lawson, M. A. Schreiner, H. L. Lee, C. E. Hellenberg, sales engineers.

Booth No. F-16—Titanium Alloy Mfg. Co., Niagara Falls, N. Y., will exhibit ferro titanium and zirconium alloy sample castings, Zircon refractories and foundry Zirconite products. Representatives: W. G. Wellings; G. F. Comstock; S. T. Harleman.

Booth No. F-22—Edward G. Budd Mfg. Co., Twenty-fifth & Hunting Park, Philadelphia, (Subsidiary: Budd Induction Heating Inc.) will exhibit products heat treated by Budd induction heating system. Representatives: H. E. Somes; H. O. Mainzinger.

Booth No. F-6—Baldwin Locomotive Works. Paschall P. O., Philadelphia (Baldwin Southwark Division and Standard Steel Works Division, same address; Cramp Brass & Iron Foundries, Eddystone, Pa.; Midvale Co., Nicetown, Philadelphia) will exhibit in operation new and standard Southwark-Tate-Emery universal testing machines, stress-strain measuring instruments; sample products including bronze propeller blade, small weldless rings, hardened and ground rolls, extrusion liners, heat and corrosion resisting castings. Representatives (Baldwin Locomotive Works): Stewart McNaughton; C. A. Campbell; (Baldwin Southwark Division): F. G. Schranz, general manager; F. G. Tatnall and W. H. Harman Jr., testing machine division; (Standard Steel Works Division): R. N. Watt; (Cramp Brass & Iron Foundries Division): N. H. Schwenk, general manager; J. J. Nelson; (Midvale Co.): H. H. Ziesing.

New round shank boring tools of titanium tungsten carbide include grades for most types of precision boring and finishing work. Shown by McKenna Metals Co., 200 Lloyd avenue, Latrobe, Pa.



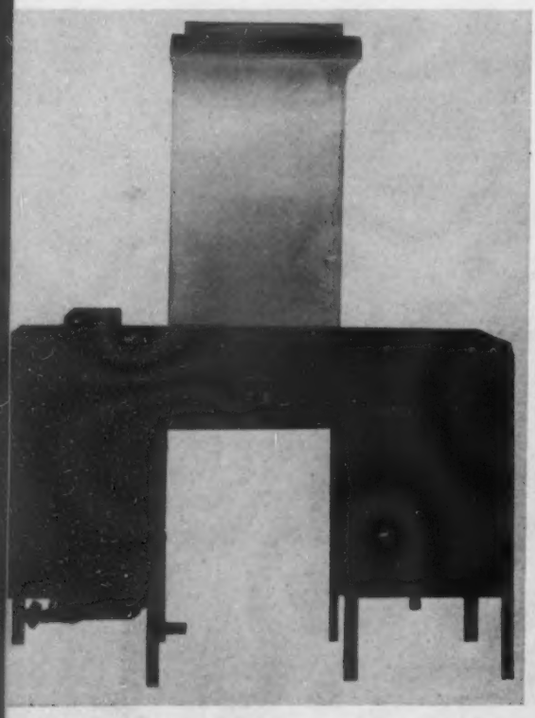
Booth No. F-26—Metal & Thermit Corp., 120 Broadway, New York, will demonstrate Murex electrodes and show pictorially Thermit welding process. Representatives: J. B. Tinnon, sales manager; H. T. Thompson of Pittsburgh, C. D. Young of Chicago, district managers; C. D. Cooper, E. J. Knapp, John Plaskon, welding experts; M. L. Smith, advertising manager.

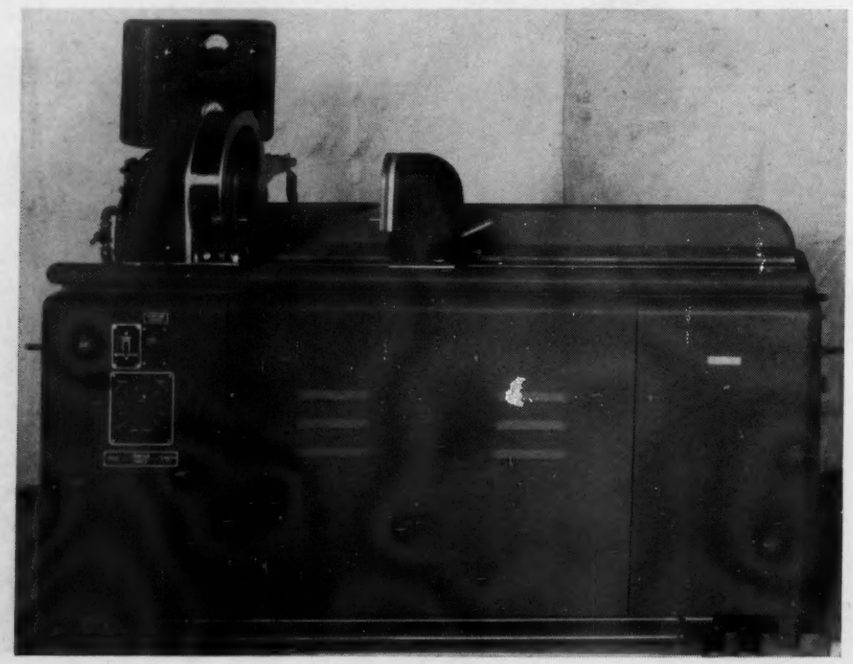
Booth No. F-31—American Rolling Mill Co., Middletown, O., will exhibit an air raid and munitions shelter and will demonstrate fabricating and finishing operations on metal sheets. Representatives: G. F. Ahlbrandt, assistant vice president; J. P. Butterfield, manager; F. A. Tobitt Jr. and John Owen, stainless steel sales department; Dr. Anson Hayes, director, Reed Kenyon, associate director, and B. F. Finkbone, products engineer, Research Laboratories; C. F. Feledy, W. A. Kuenzel and F. B. Dechant, sales engineers; R. A. Dadisman, manager, and R. M. Nelson, Market Development Division; F. A. Tobitt, manager eastern sales department; A. M. Wortley, manager, and F. S. Campbell, Philadelphia office.

Booth No. F-30—Kennecott Copper Corp., Chase Brass & Copper Co. (subsidiary), Waterbury, Conn., will demonstrate welding with brass and copper and display brass and copper products. Representatives: J. Vreeland; J. Babin; W. E. Evans; F. Gallo; N. Mitchell.

Booth No. F-38—W. J. Holliday & Co., Hammond, Ind. (Distributors: Brown-

Left, the new combination Magnaflux inspection unit and demagnetizer, Model SCQ-SH-10. Right, Model ANQ-724-5, new Magnaflux inspection unit for nondestructive testing of magnetic materials. Shown by Magnaflux Corp., 5908 Northwest highway, Chicago

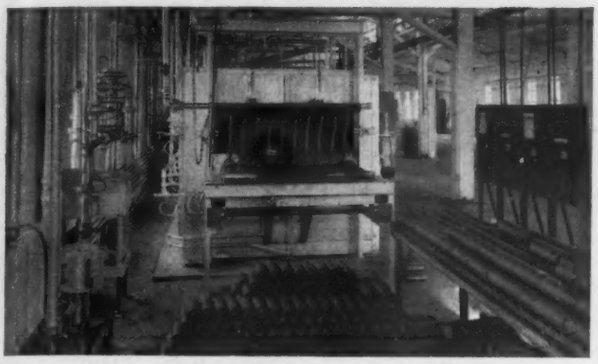




EF FURNACES

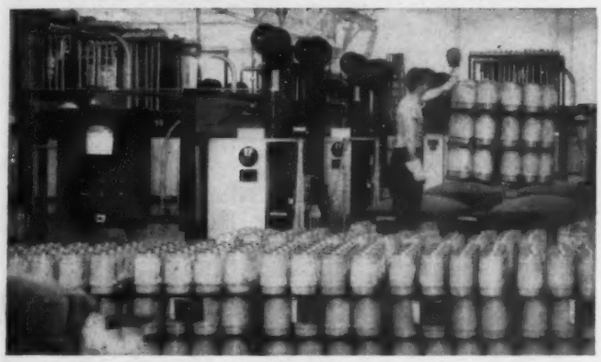
For Every Industrial Heat Treating Process

A Few More E F Installations for National Defense are Shown Below



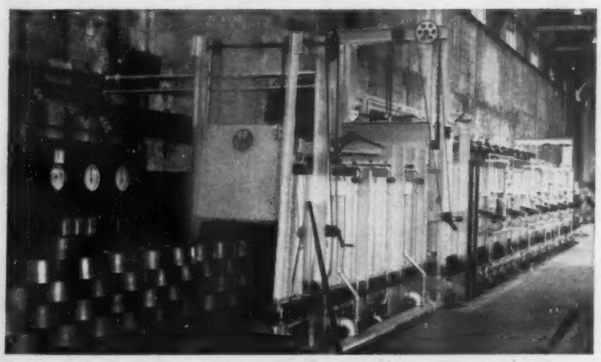
Heat Treating Shells . . Automatically

This EF gas-fired special atmosphere pusher type shell heat treating installation, consisting of a tube type hardening furnace, an automatic oil quenching equipment and a draw furnace, hardens shells uniformly, scale-free, continuously and automatically — one of several sizes and types we have designed and built for this purpose.



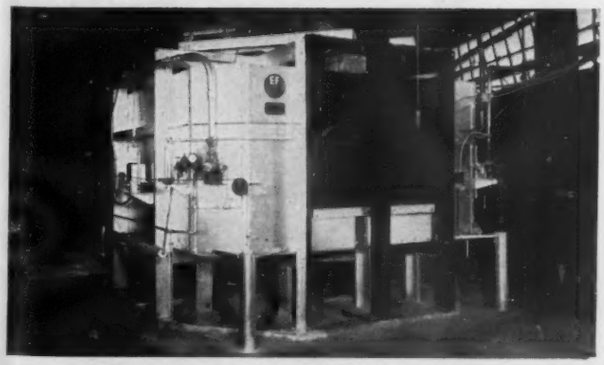
Nitriding Aircraft Engine Cylinders

These EF furnaces produce the uniformly hard, wear-resisting surfaces required on aircraft engine cylinders and other aircraft engine parts. Designed for mass production, these EF nitriding furnaces are mounted on rails, in rows and in such a manner as to permit practically continuous operation. Built in various sizes and types.



Annealing Brass for Cartridge Cases

Coiled copper alloy sheet at the rate of 10,000 lbs. per hour, is annealed in this EF gas fired continuous roller hearth type furnace. Equipped with circulating fans and spray quench for uniform heating and cooling, this equipment handles coils up to 24″ in diameter and 26″ in width—continuously. No trays are used—100% net material.



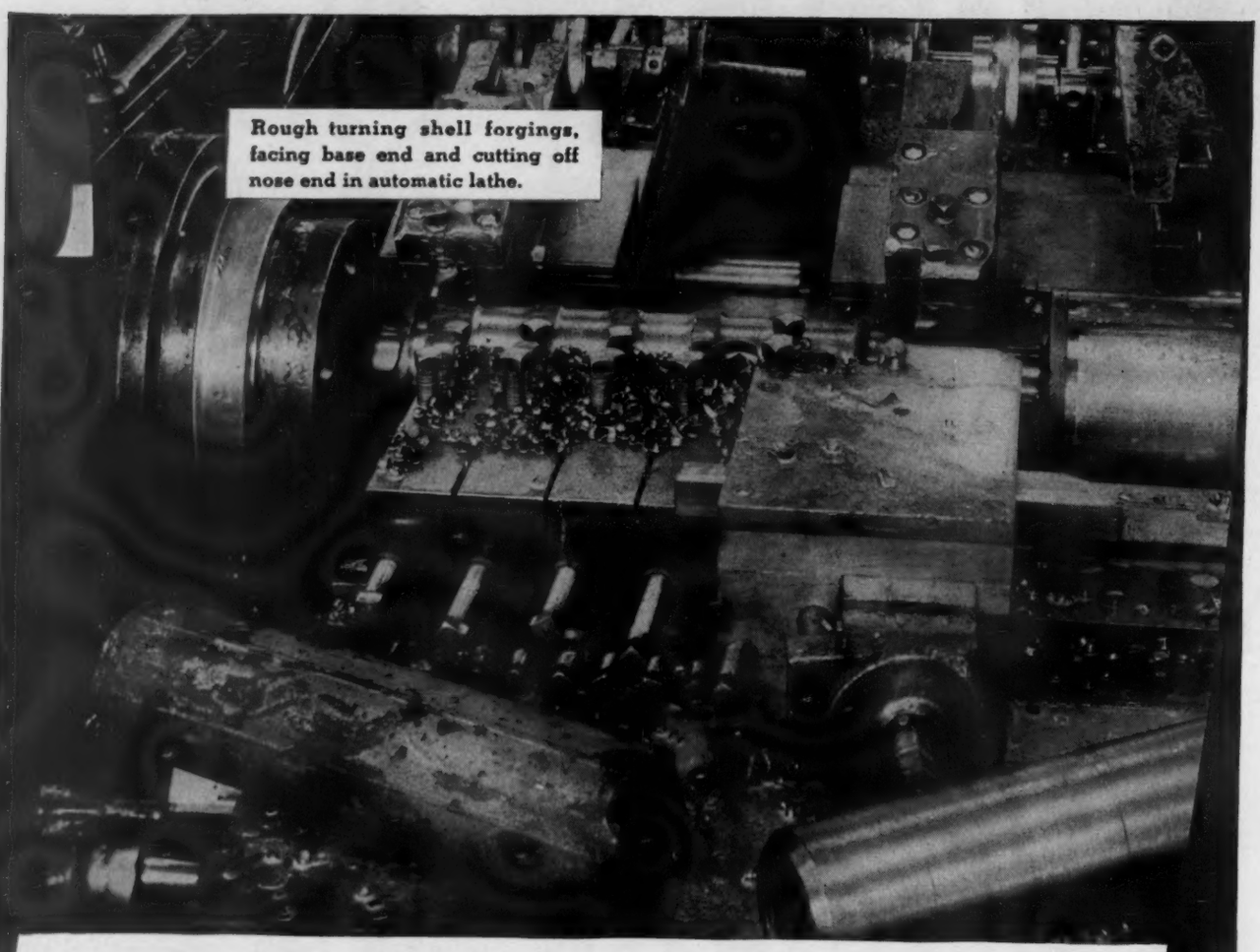
Heat Treating Alloy Steel Forgings

An EF oil fired continuous rotary hearth type furnace—one of a number we built for heating alloy steel forgings for drawing, hardening and normalizing at temperatures ranging from 1000 to 1800° F. This installation has capacity for heating to 1800° F., 1000 lbs. of steel per hour. Can also be furnished in larger or smaller sizes.

We build furnaces for bright annealing, scale-free hardening, forging, copper brazing, nitriding, normalizing, billet heating, and for every other heat treating process. We solicit your inquiries.

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production



Rough turning shell forgings, facing base end and cutting off nose end in automatic lathe.

STANDARDIZED, WIDELY-AVAILABLE

Tungsten-saving

MO-MAX

MOLYBDENUM-TUNGSTEN HIGH SPEED STEEL

MO-MAX, the original "Moly" high speed steel, offers exclusive advantages due to

- Availability through twelve independent sources
- Eight years of use
- Thousands of tons produced
- Millions of tools made
- A uniform and reliable all-purpose high speed steel
- Standardized composition and manufacture

For booklet and list of sources, write
The Cleveland Twist Drill Co.

Formula for general purpose

MO-MAX

Standard with twelve of the leading steel mills.

Carbon	.80
Molybdenum	8.50
TUNGSTEN	1.50
Chromium	4.00
Vanadium	1.00

Available also in the cobalt types for those who require cobalt high speed steel.

Wales Co., Boston; Horace T. Potts Co., Philadelphia; Burger Iron Co., Akron; Beals, McCarthy & Rogers Inc., Buffalo; W. J. Holliday & Co., Indianapolis) will exhibit finished products of Speed Case X1520 and Speed Treat X1545 hot rolled steel plate. Representatives: W. J. Holliday; C. O. Bucksot, vice president; L. M. Van Deman, manager of sales; and others.

Booth No. F-39—Ohio Carbon Co., 12508 Berea road, Cleveland, will demonstrate new burnisher for honing commutators and slip rings, will show carbon graphite and metal graphite brushes. Representatives: A. K. Moulton, president; L. A. Leonard, vice president; L. L. Stoffel, treasurer; Dr. I. W. Brandel, sales manager; F. C. Aurand, secretary; A. A. Stark, chief engineer; F. P. Kobert, R. A. Davidson, territorial representatives.

Booth No. F-41—Motch & Merryweather Machinery Co., Penton building, Cleveland, will demonstrate No. 3 cold sawing machine, No. 1 automatic saw sharpening machine; will show headstock running with glass top on table and gearing laid out for inspection. Representatives: E. J. Kossuth, sales representative; M. B. Sampson, engineering department; W. E. Hauck, Richard McFadden, demonstrators.

Booth No. F-42—Nicholson File Co., Providence, R. I., will demonstrate regular and special files including lathe, foundry, shear tooth, Type A aluminum, die cast and X. F. Swiss pattern files and files for stainless steel.

Booth No. F-46—Bausch & Lomb Optical Co., Rochester, N. Y. No information available.

Booth No. F-45—Cities Service Oil Co., Bartlesville, Okla., will exhibit lubricants for machine tools and in operation the heat prover and sealed lubrication ride improver. Representative: B. B. Mears and others.

Booth No. F-50—Ampco Metal Inc., 1745 South Thirty-eighth street, Milwaukee, will exhibit cast and fully machined parts, centrifugal castings and Ampco Trode aluminum-bronze coated weld rod. Welding booth will be in operation. Representatives: Ray W. Uecker, secretary-treasurer; J. D. Zaiser, assistant general manager; R. J. Thompson, district manager; A. H. Stodder, H. C. Haines, H. R. Gordon, R. S. Stover, district representatives; C. E. Swift, welding engineer.

Booth No. F-54—American Gasifier Co., Wallingford, Conn. No information available.

Booth F-53—No information available.

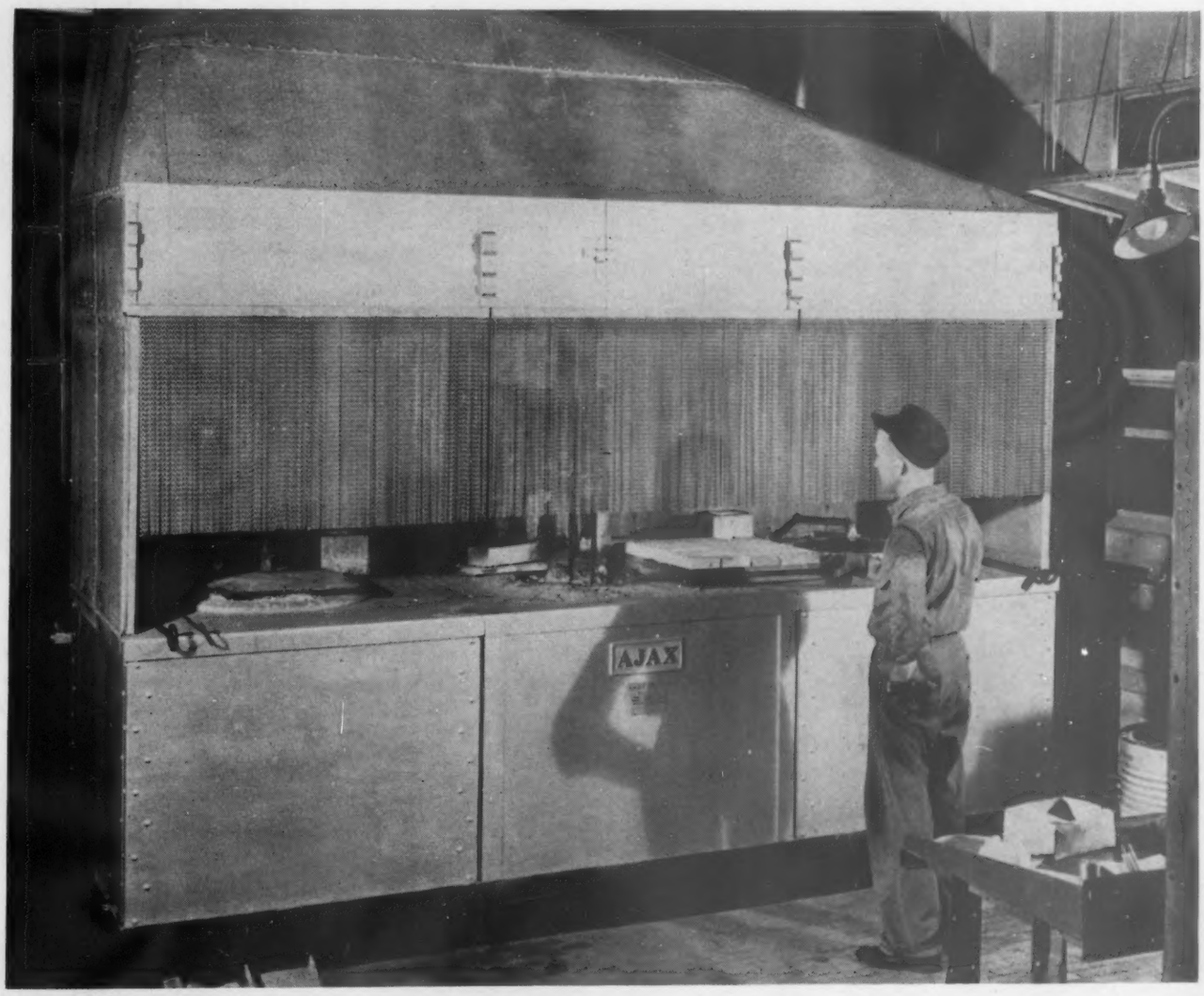
Booth No. F-57—Gardner Publications Inc., Cincinnati, will exhibit publications. Representatives: D. G. Gardner, publisher; Howard Campbell, editor, *Modern Machine Shop;* F. W. Vogel, editor, *Products Finishing;* J. M. Krings, advertising manager; G. M. Fillmore, eastern manager; R. E. Ahrensdorf, eastern representative; G. E. Hay, central-western manager; G. H. Meyers, western manager.

Booth No. F-58—Henry Disston & Sons Inc., Tacony, Philadelphia. No information available.

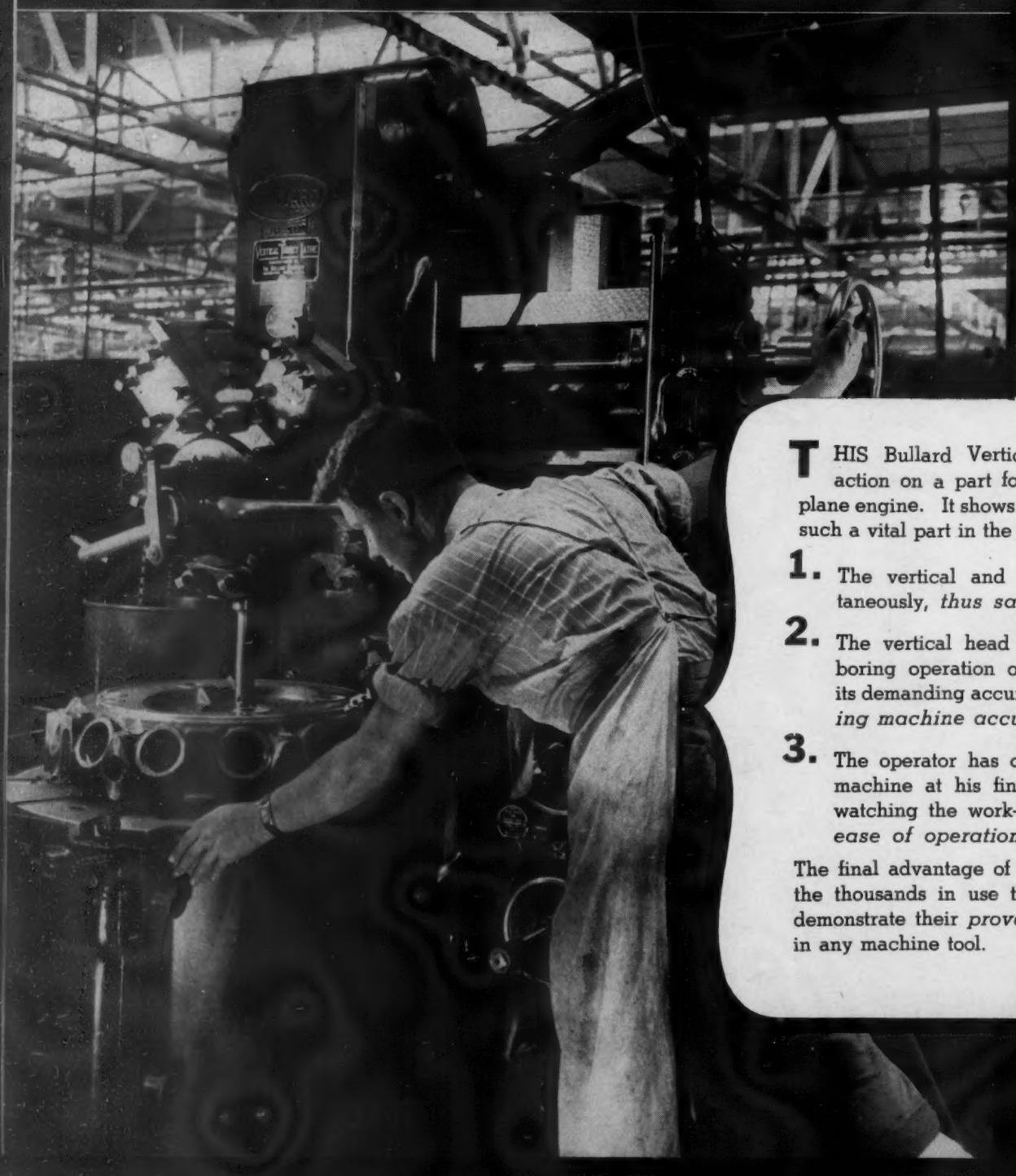
Booth No. G-57—Pittsburgh Pipe Cleaning Co., Pittsburgh. No information available.

Booth No. G-58—Hitchcock Publishing Co., Chicago, will exhibit publications. Representatives: R. C. VanKampen, president and general manager; W. G. Paulson, editor; R. E. Stewart, assistant

Three Ajax-Hultgren furnaces for heat treating molybdenum and tungsten high-speed-steel tools, with ceramic or alloy steel pots for use at temperatures up to 2400 degrees Fahr. Shown by Ajax Electric Co. Inc., Frankford and Delaware avenues, Philadelphia



To the Man Who *Never*



THIS Bullard Vertical Turret Lathe is in action on a part for a world famous aero plane engine. It shows why V.T.L.s are playing such a vital part in the defense program.

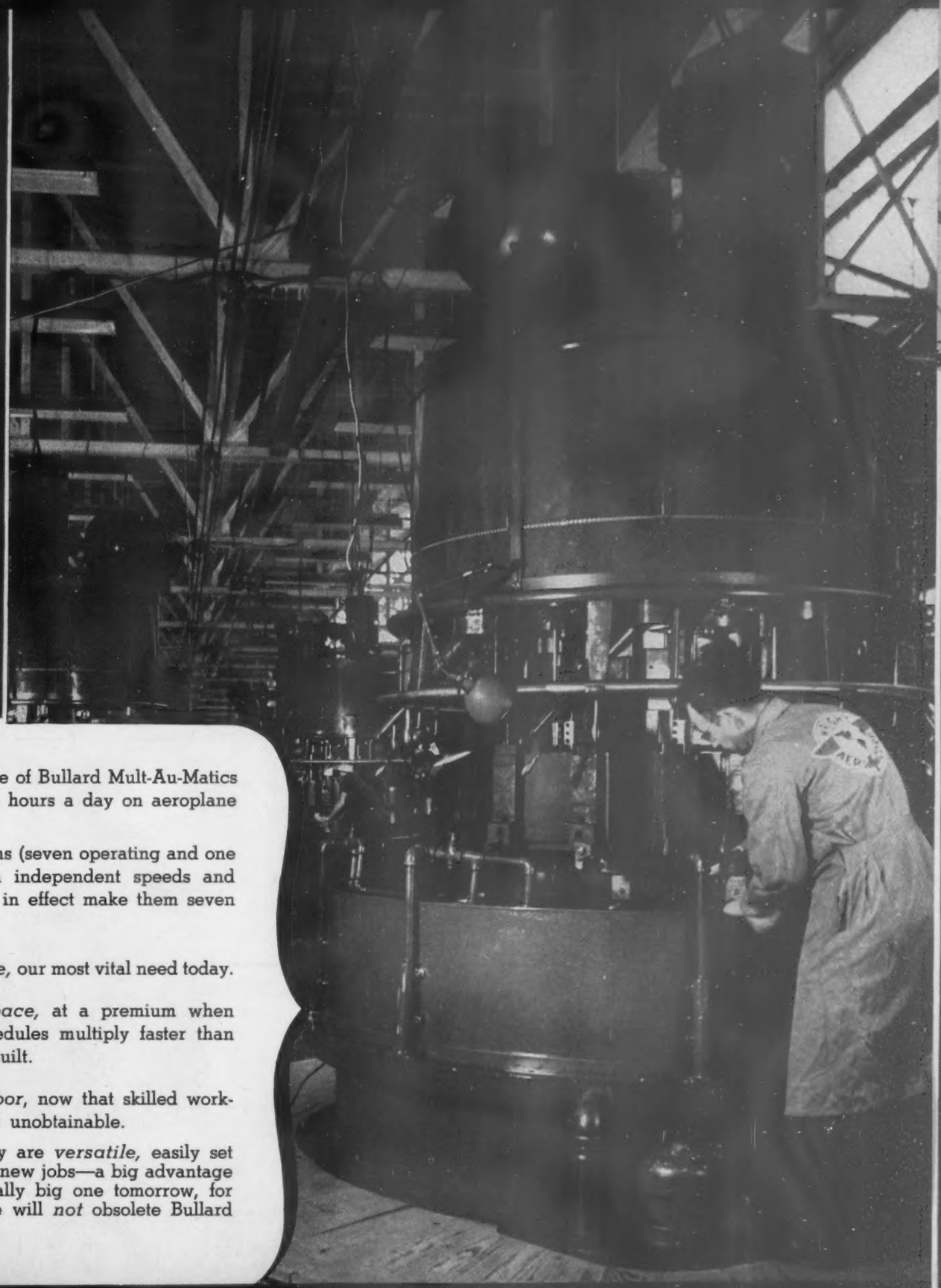
1. The vertical and side heads cut simultaneously, *thus saving time.*

2. The vertical head is performing a finish boring operation on a product noted for its demanding accuracy, *thus demonstrating machine accuracy.*

3. The operator has complete control of the machine at his finger tips while closely watching the work—*thus demonstrating ease of operation.*

The final advantage of V.T.L.s is the fact that the thousands in use throughout the country demonstrate their *proven reliability,* so vital in any machine tool.

r Makes the Headlines



THIS double aisle of Bullard Mult-Au-Matics is operating 24 hours a day on aeroplane engine parts.

Their eight stations (seven operating and one loading) each with independent speeds and independent feeds, in effect make them seven machines in one.

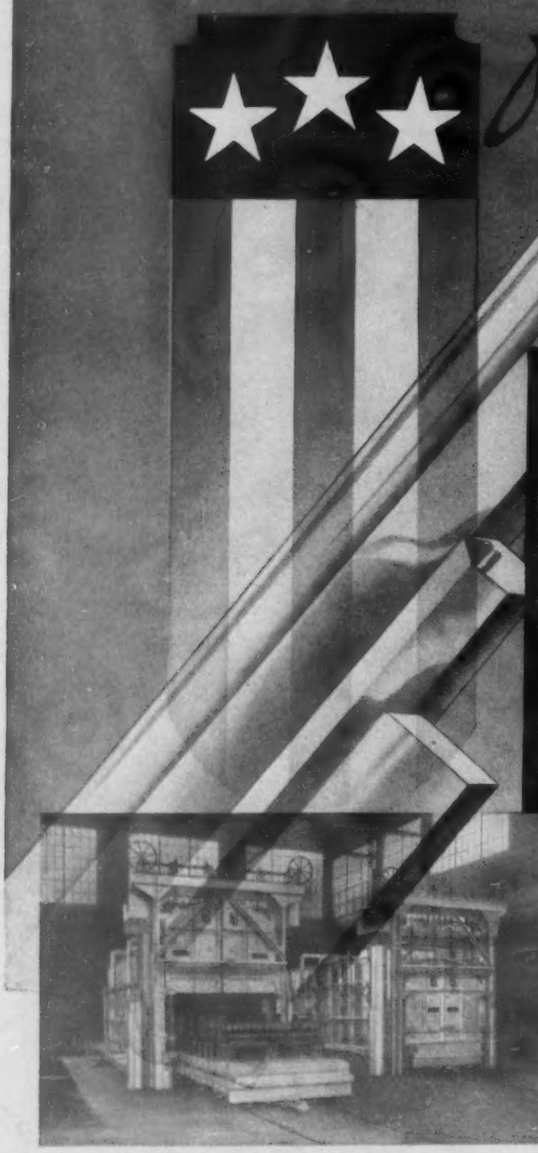
1. *They save time,* our most vital need today.
2. *They save space,* at a premium when production schedules multiply faster than plants can be built.
3. *They save labor,* now that skilled workmen are almost unobtainable.

And above all, they are *versatile,* easily set up and retooled for new jobs—a big advantage today, and an equally big one tomorrow, for the return of peace will *not* obsolete Bullard Mult-Au-Matics.

BULLARD COMPANY BRIDGEPORT CONNECTICUT

Accept our half century of *Experience*

for the BIG JOB *ahead!*

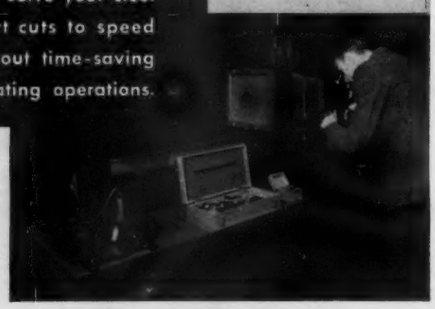


COLD FINISHED STEELS

are now on double duty . . . serving in the front rank of defense materials and supplying the urgent needs of industry. With so little time to do so much, all our resources are mustered into production. Maximum standards of quality and accuracy are maintained to insure that B & L Bar Steels and Shafting will make good in every vital field of use. High strength Alloys for aircraft parts, rugged Shafting for heavy equipment, free-cutting Screw Stock for fast machining, Furnace-treated Bars for special applications . . . these and many other types of steels are available for the big job ahead.

Why not enlist our specialized experience in your service for the duration! B & L engineers can help solve your steel problems, suggest short cuts to speed up production or work out time-saving methods in your fabricating operations.

B & L Furnace Treated Steels for your special requirements are supplied as Annealed, Normalized or Spheroidized Bars, or as Cold Drawn Strain-Drawn Bars.

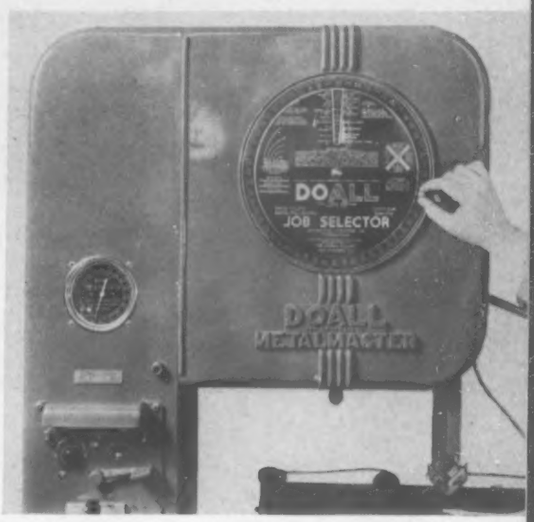


Modern laboratory control is a constant factor in maintaining B & L production uniformity and cold finished steel quality.

COLD DRAWN BARS • GROUND SHAFTING • SCREW STOCK • ANNEALED BARS • ALLOY STEELS

BLISS & LAUGHLIN, INC.

HARVEY, ILL. Sales Offices in all Principal Cities BUFFALO, N.Y.



New Doall Job Selector covers 56 basic materials, showing sawing speed, saw pitch, saw temper and saw set to be used to obtain most economical performance from Doall contour sawing, filing and polishing machines. Shown by Continental Machines Inc., 1301 Washington avenue South, Minneapolis

editor; R. J. Ferncase, advertising manager; W. E. Hoffman, eastern representative; D. B. Trott, mid-western representative.

Booth No. G-53—Parker-Kalon Corp., 200 Varick street, New York, will exhibit self-tapping screws and other fastening devices including cold-forged wing nuts, thumb screws and socket screws. Representatives: C. S. Trott, sales manager; J. J. Mathe, sales engineer.

Booth No. G-54—Callite Tungsten Corp., Union City, N. J. (Tungsten Electric Corp., same address), will exhibit wire and wire products, tungsten, molybdenum and nonferrous alloys, cemented tungsten carbide, tools, dies, blanks and special shapes. Representatives (Callite Tungsten Corp.): C. H. Kraft, president and general manager; G. C. Wheeler, vice president; J. Kurtz, treasurer and director of research; D. R. Donovan, general sales manager; M. A. Fox, H. M. Lusk, H. Malm, A. L. Avia, sales engineers; (Tungsten Electric Corp.): J. A. Storrs, vice president and sales manager; G. T. Brennan, H. B. Eastman, Ernest Seamans, sales engineers.

Booth No. G-50—S. B. Whistler & Sons Inc., Buffalo, N. Y., will demonstrate adjustable perforating dies on power punch press. Representatives: L. V. Whistler; Arthur Jackson; C. Rumberger.

Booth No. G-46—MacDermid Inc., Waterbury, Conn., will exhibit cartridge cases and other products cleaned with new chemical compounds, specimens cleaned before and after salt annealing and before cadmium, zinc and chromium plating. Representatives: Harold Leever, western sales manager; W. C. MacDermid, vice president and sales manager.

Booth No. G-47—Barrett-Cravens Co., 3262 West Thirtieth street, Chicago, will exhibit in operation a lift truck, lift-truck platform and elevator. Representatives: E. J. Heimer, vice president; O. L. Jenkins, district manager; H. C. Morrison of Cleveland.

Booth No. G-43—Baker & Co. Inc., Newark, N. J., will exhibit platinum and platinum clad laboratory equipment, precious metal thermocouples and protection tubes, electric furnace, and gas furnaces in operation. Representatives: H. J. Russell; L. C. Burman.

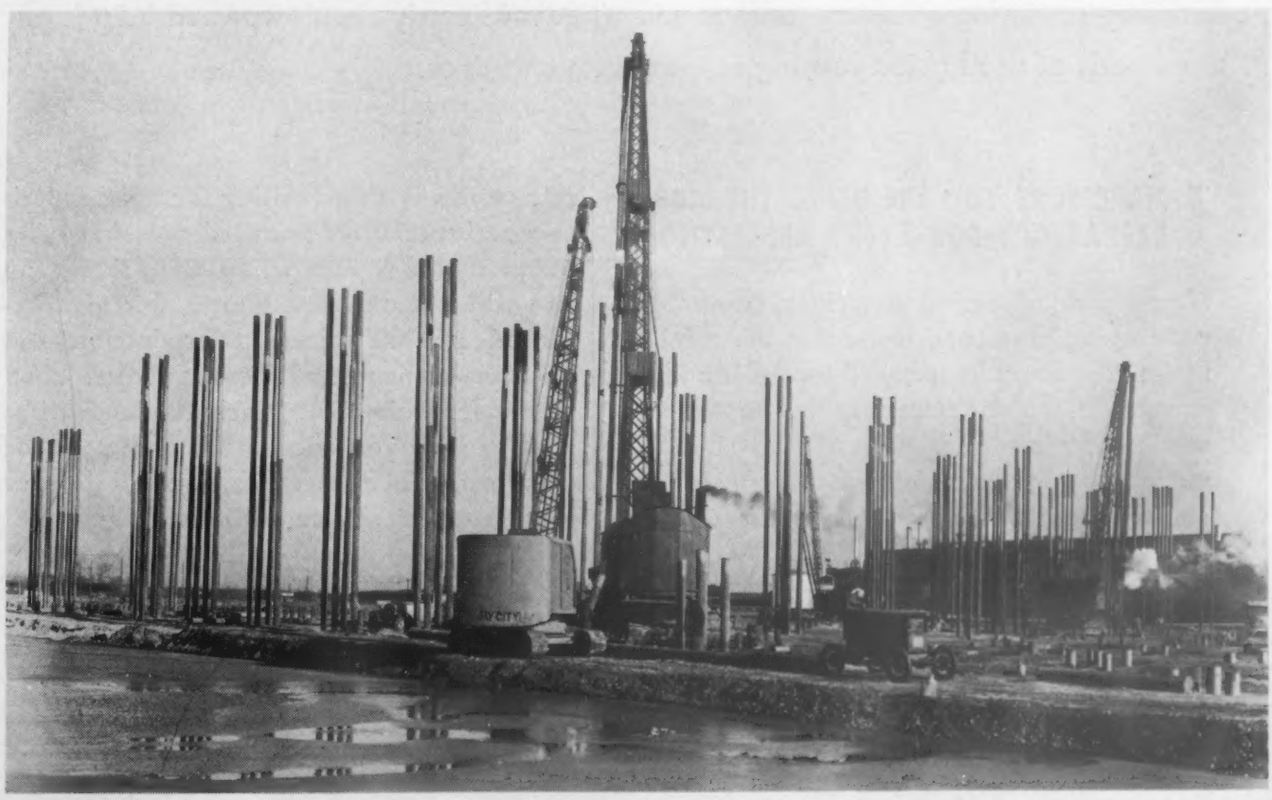
Booth No. G-42—Machinery Mfg. Co., Vernon, Los Angeles. No information available.

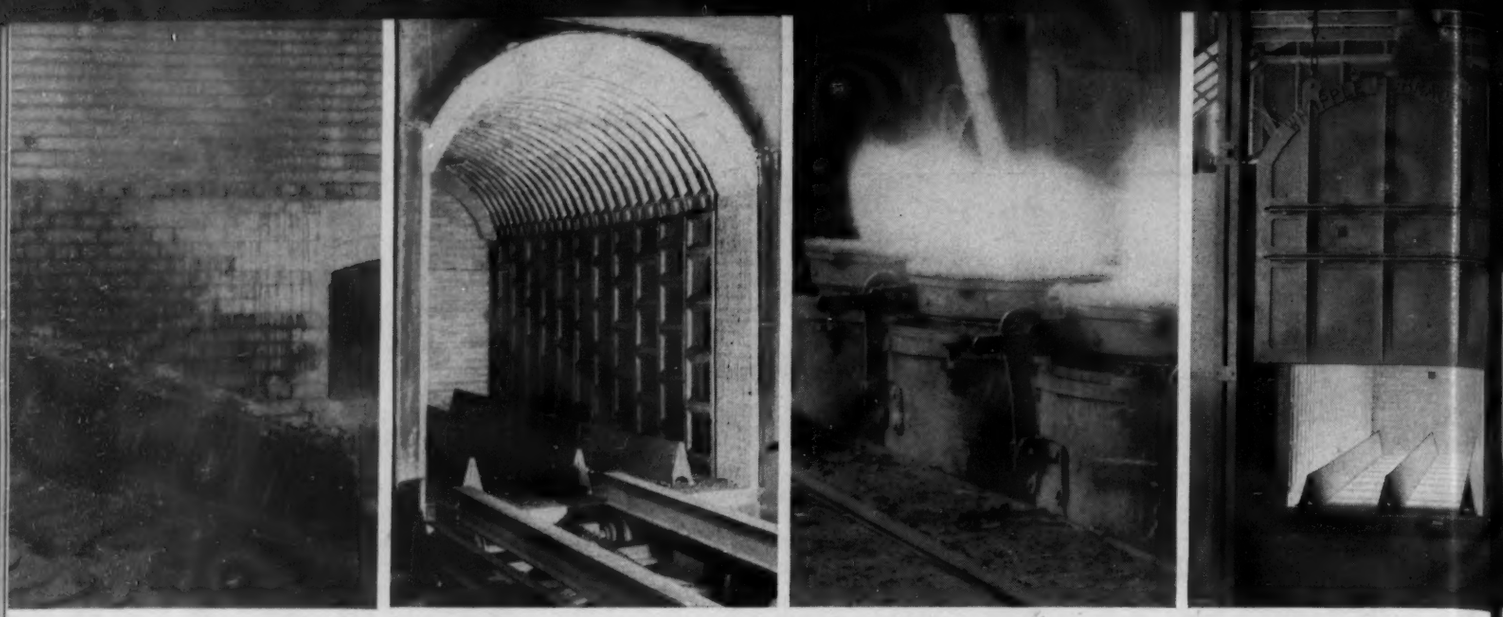
Booth No. G-38—Farrand Foundry Corp., Bloomfield, N. J., will exhibit castings from patterns through rough finish. Representative: G. D. Smith Jr., sales manager.

Booth No. G-38—Specialties Mfg. Co., Bloomfield, N. J., will demonstrate lathe with special attachments and also powered Simplex stock reel. Representative: Lewis Randolph.

Booth G-39—Abrasive Co., Tacony and Fraley streets, Philadelphia, will exhibit grinding wheels, abrasive materials and

Forty-five miles of Armco Spiral-Welded pipe piles support the 500 building footings at the new Ford Motor Co.'s River Rouge aircraft plant. The 3500 tons of pipe here are 10¾-inch diameter, 0.259 and 0.307-inch wall thicknesses in 90 to over 100-foot driven lengths. A battery of pile drivers drove the first driving-point-equipped lengths. Next sections were placed on first by crawler crane, tackwelded in position, finish welded by a second crew; driving completed; piles cut off at grade filled with concrete; column footing excavations completed; piles cut off at final level; footings poured. Pipe made by American Rolling Mill Co., Middletown, O.





In the Interest of Defense...

To get the maximum

NOW when America needs our utmost productive effort it is more important than ever that furnaces of all types be operated continuously at full capacity. That is why we suggest below the few simple rules which will enable you to get more service out of the refractories on which successful furnace operation so largely depends. By faithfully following these suggestions you will avoid costly shutdowns and help keep the wheels of production turning at maximum efficiency.

1 MAKE SURE YOU ARE USING THE RIGHT REFRACTORY FOR EVERY APPLICATION

If you are purchasing new installations or making replacements, insist that the refractories are accurately specified for the job they have to do. No one refractory will answer all service requirements. With the advance of metallurgical science, furnace construction is becoming more complex, and the selection of refractories is a task calling for wide experience and specialized knowledge. Refractories of exactly the right type, material, shape and size will not only last longer, but give improved results, increased production and lower maintenance and operating costs. Whatever your requirements, Carborundum will be glad to help you choose the refractory, or combination of refractories, that will do your job most efficiently and economically.

Visit us in Booth 236 at the Show

THE CARBORUNDUM COMPANY

REG. U. S. PAT. OFF.

Service from your Refractories

2 MAKE SURE THE REFRACTORIES YOU USE ARE PROPERLY INSTALLED

Any refractory installation will give better results if it is properly set. Each piece should be accurately set, in proper alignment, with every joint thoroughly sealed with the correct cement. Thorough workmanship in installing the right refractory will pay big dividends in lowered operating and maintenance costs, elimination of production interruptions and improvement in the quality of your work.

3 MAKE SURE YOUR EQUIPMENT IS IN GOOD CONDITION

The right refractory, correctly installed, will still not give the results you can rightfully expect if your furnace equipment is not in good condition. All burners should be properly adjusted, and mechanical parts in proper working order. The frequent inspections and careful servicing necessary to maintain this condition will be amply repaid in higher efficiencies and lower costs.

WRITE FOR FREE BOOKLET!

Your own operators will be able to solve many common refractory problems with the aid of our new illustrated book "Super Refractories by Carborundum". It tells the whole story of super refractories and contains many additional pages of helpful information and data. Write for your free copy today.

District Sales Branches: Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh. Distributors: McConnell Sales and Engineering Corporation, Birmingham, Ala.; Christy Firebrick Company, St. Louis, Mo.; Harrison & Company, Salt Lake City, Utah; Pacific Abrasive Supply Company, Los Angeles, San Francisco, Calif.; Denver Fire Clay Company, El Paso, Texas; Smith-Sharpe Company, Minneapolis, Minn.

(Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company)

REFRACTORY DIVISION, PERTH AMBOY, N. J.

balancing ways assembly to show perfect balance of grinding wheels. Representatives: R. S. Trimble, W. E. Reed, sales representatives; D. S. Saurman, advertising manager; W. B. Ilko, sales manager.

Booth No. G-36—Gulf Oil Corp., 1515 Locust street, Philadelphia, will exhibit lubricants and feature lubrication engineering service and periodic consultation service. Representatives: Joseph Marshall Jr., division lubrication engineer; A. E. Townsend, industrial sales engineer.

Booth No. G-34—Matchless Metal Polish Co., 840 West Forty-ninth place, Chicago, will exhibit nonferrous metal compositions; greaseless composition for cutting down; Tampico and wire brushes; buffing compositions for use on brass, copper, aluminum, stainless steel, zinc and lead die castings, bronze, plastics, rubber, celluloid, wood and plated ware. Representatives: H. S. Kelshaw, division manager; J. W. Varick, field engineer; W. H. Torrance, W. D. Mildren, sales department.

Booth No. G-34—Advance Polishing Wheels Inc., 844 West Forty-ninth place, Chicago, will exhibit Perma-Core buffs, Pioneer polishing wheels and Modern buffing wheel rake. New products include Glen Ridge polishing wheel. Representatives: J. J. Manderscheid, president; John Welhaven, superintendent; George O'Connell, production manager.

Booth No. G-35—Synthane Corp., Oaks, Pa., will exhibit Bakelite products and Noisometer. Representatives: J. K. Johnson, manager Philadelphia sales district; E. E. Smith, Philadelphia representative.

Booth No. G-31—Elastic Stop Nut Corp., Union, N. J., will exhibit pictures of stop nut applications.

Booth No. G-30—Hamilton Mfg. Co., Two Rivers, Wis., will exhibit Auto-Shift table and Calumet shallow drawer steel blueprint filing unit. Representatives: R. W. Brunsman; H. R. Morris; J. G. Embury; W. A. Friedrich; D. C. Dean.

Booth No. G-26—Induction Heating Corp., 389 Lafayette street, New York, will exhibit new Thermonic generator for induction heating application of all types.

Booth No. G-22—No information available.

Booth No. G-16—No information available.

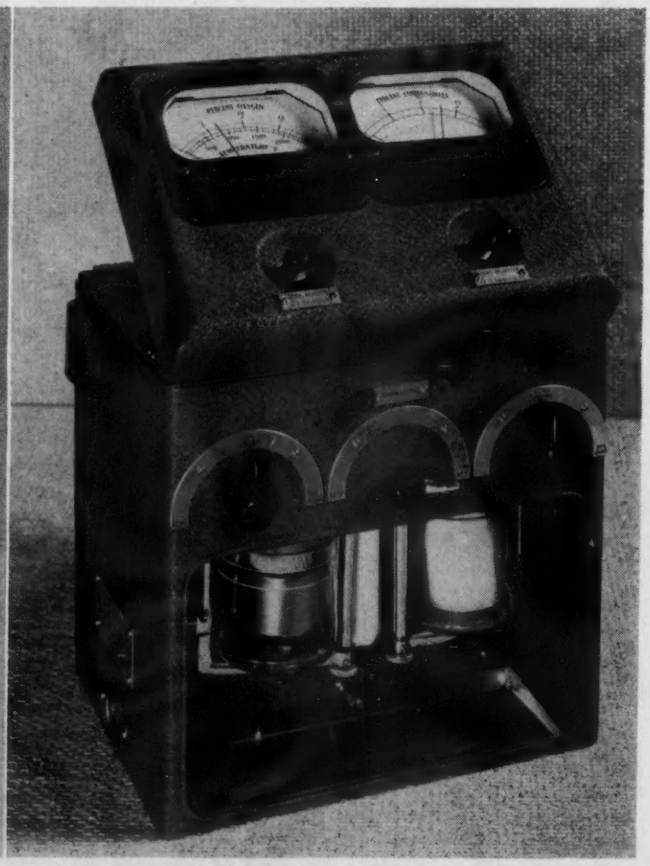
Booth No. G-17—Joseph T. Ryerson & Son Inc., Sixteenth and Rockwell streets, Chicago, will exhibit samples of machining and carburizing A4119, new nonnickel carburizing steel. Representatives: G. Van Dyke, manager special steels department; J. W. Queen Jr., Jersey City; H. B. Briggs, Boston; G. F. Roeder, Buffalo; C. C. Bray, Philadelphia.

Booth No. G-13—Charles Hardy Inc., New York, will exhibit metal powders and products made from metal powders. Representatives: Charles Hardy, president; R. L. Patterson, vice president; F. H. Mulligan, sales manager; J. B. Christie, in charge of research and development; G. D. Cremer, J. J. Cordiano, research and development laboratory; S. V. D. Kilbourn, administration.

Booth No. G-12—No information available.

Booth No. G-11—Colonial Alloys Co., Philadelphia, will demonstrate electroplating of metals on aluminum base aluminum alloys; cleaning and deoxidizing by chemical means; soldering; brazing; low-temperature welding; also aluminum base alloys, castings, wrought sections, extrusions and fused stainless steel will be exhibited. Representatives: Pat Casey, executive vice president; Joseph Steel, research director; Edward Engel, metallurgist; Fred Hitchinger, engineer; David Trilling, sales director; Samuel Ginns, Samuel Vance, Maxwell Feldman, C. Lipper, E. Farny, H. Erstrom, J. Mauch, A. Melroy, H. Maskell, H. Collins, S. Glantz, B. Goodman, B. Wachtel, E. Woodle, H. Wilson, F. Cole, Mr. Keachie, J. Hofer, H. Richardson, sales.

This powerful grease gun, left, assures that the grease it injects is free from contamination by employing a refinery sealed grease cartridge which is not broken until after it is inserted in gun. This helps prevent dirt and grit from entering bearings. Shown by Cities Service Oil Co., 60 Wall street, New York. At right is the Cities Service Heat Prover, an ingenious device that registers continuously and instantly changes in the amount of oxygen and combustibles in furnace gases. Is important in heat treating to check furnace atmospheres, assuring uniformity and fewer scrap losses



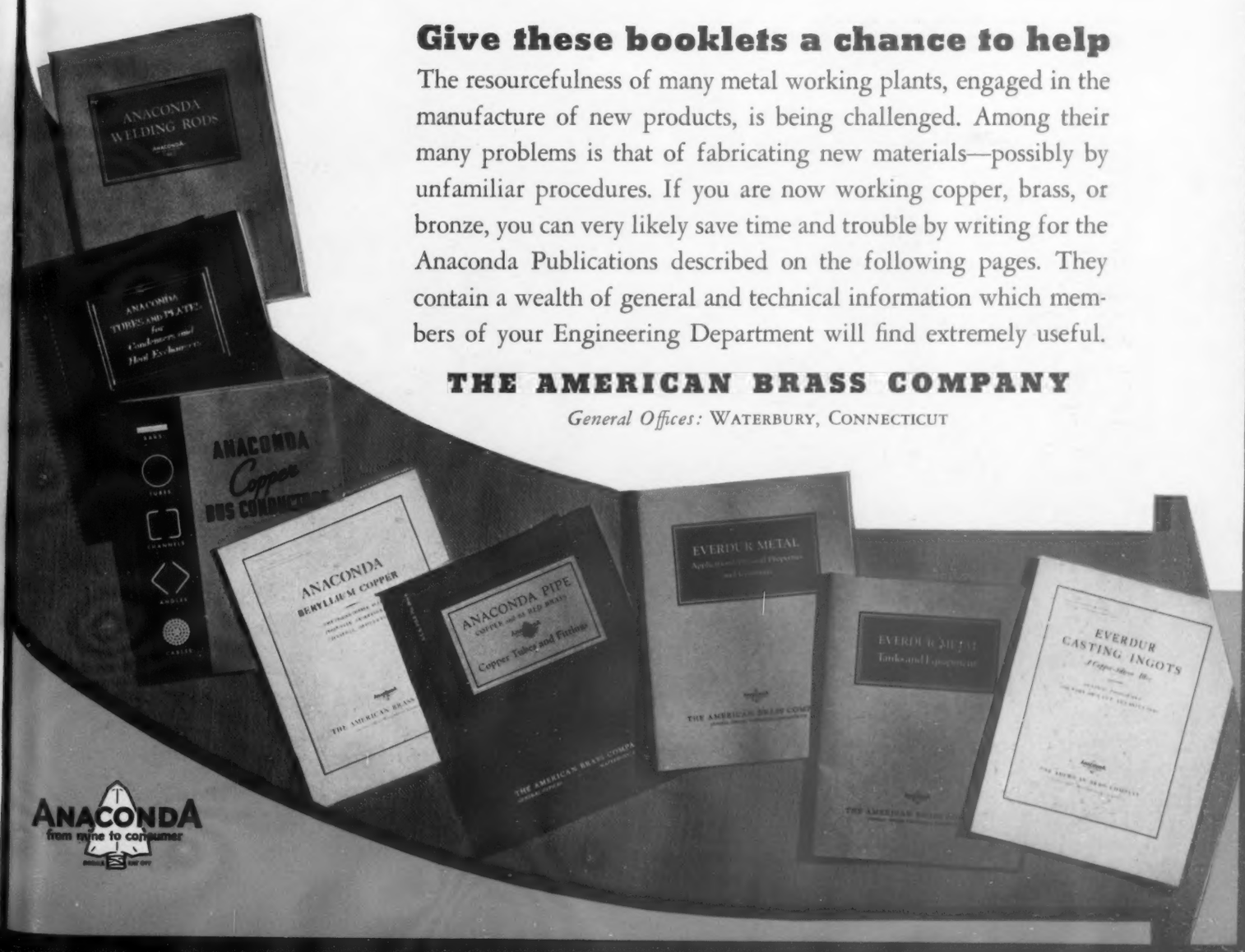
If you are working Copper or Copper-Base Alloys

Give these booklets a chance to help

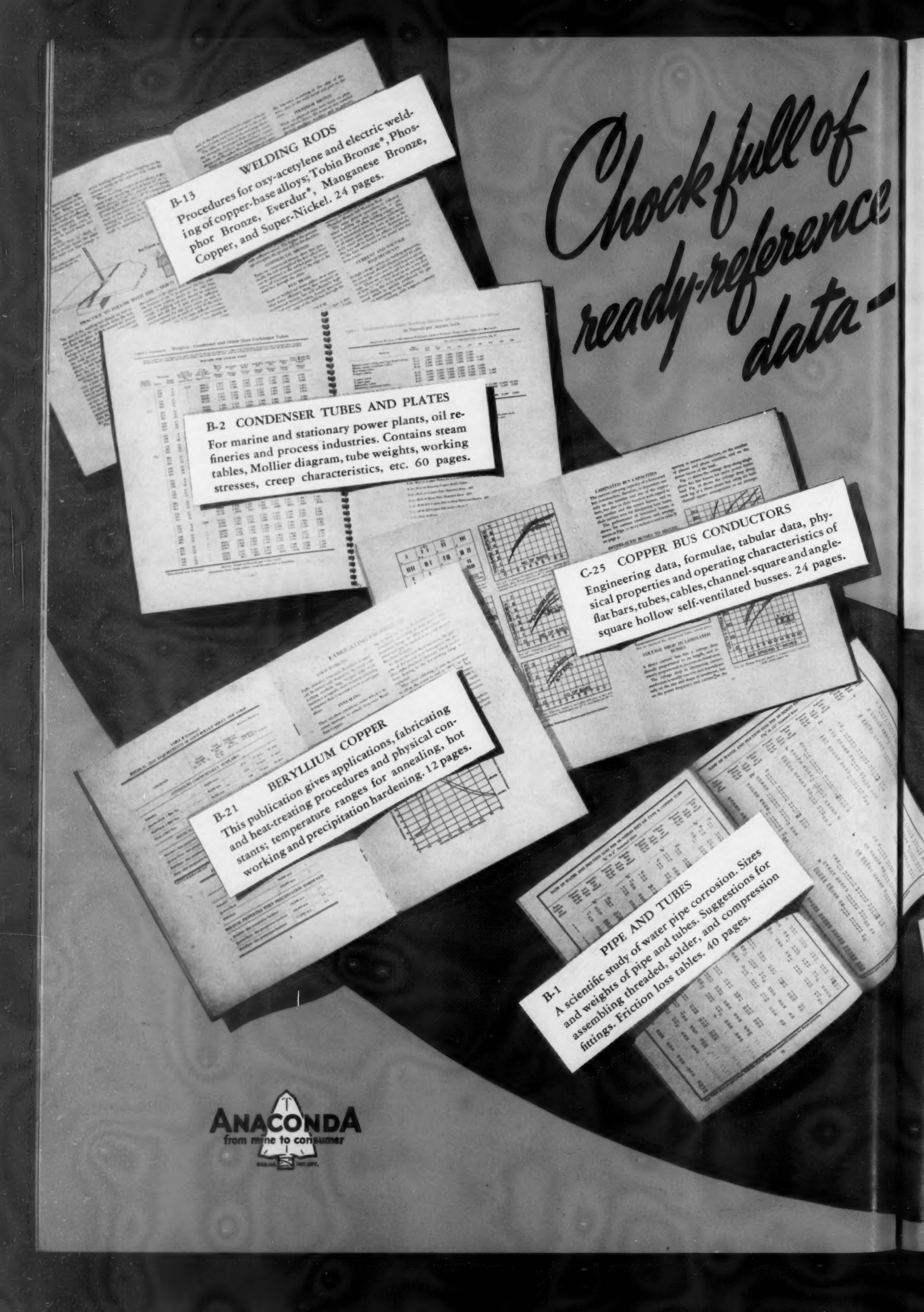
The resourcefulness of many metal working plants, engaged in the manufacture of new products, is being challenged. Among their many problems is that of fabricating new materials—possibly by unfamiliar procedures. If you are now working copper, brass, or bronze, you can very likely save time and trouble by writing for the Anaconda Publications described on the following pages. They contain a wealth of general and technical information which members of your Engineering Department will find extremely useful.

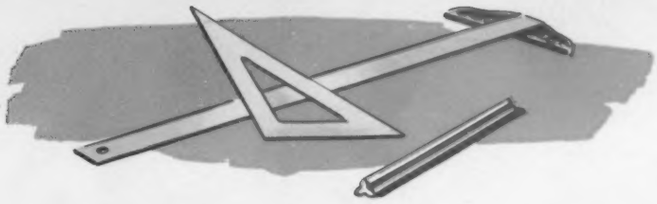
THE AMERICAN BRASS COMPANY

General Offices: WATERBURY, CONNECTICUT



ANACONDA
from mine to consumer


Chock full of ready-reference data—
B-13 WELDING RODS
Procedures for oxy-acetylene and electric welding of copper-base alloys; Tobin Bronze*, Phosphor Bronze, Everdur*, Manganese Bronze, Copper, and Super-Nickel. 24 pages.
B-2 CONDENSER TUBES AND PLATES
For marine and stationary power plants, oil refineries and process industries. Contains steam tables, Mollier diagram, tube weights, working stresses, creep characteristics, etc. 60 pages.
C-25 COPPER BUS CONDUCTORS
Engineering data, formulae, tabular data, physical properties and operating characteristics of flat bars, tubes, cables, channel-square and angle-square hollow self-ventilated busses. 24 pages.
B-21 BERYLLIUM COPPER
This publication gives applications, fabricating and heat-treating procedures and physical constants; temperature ranges for annealing, hot working and precipitation hardening. 12 pages.
B-1 PIPE AND TUBES
A scientific study of water pipe corrosion. Sizes and weights of pipe and tubes. Suggestions for assembling threaded, solder, and compression fittings. Friction loss tables. 40 pages.
ANACONDA
from mine to consumer



on Copper, Brass and Bronze

and Yours for the Asking!

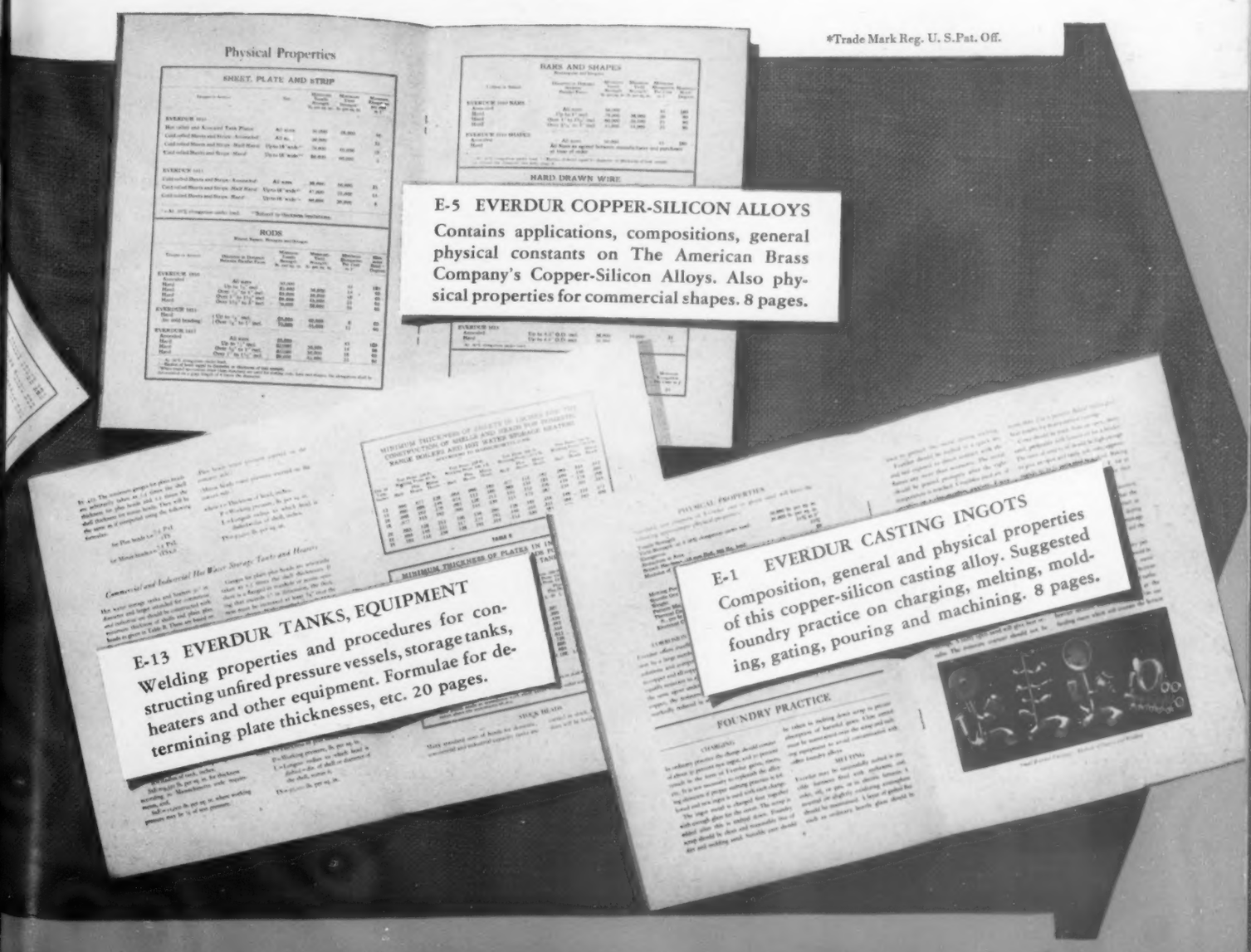
THESE Anaconda Publications have been made available by The American Brass Company to assist your Engineering and Production Departments. Authoritative in all respects, these booklets are literally packed with useful, technical information, specifications and tabular data, such as:

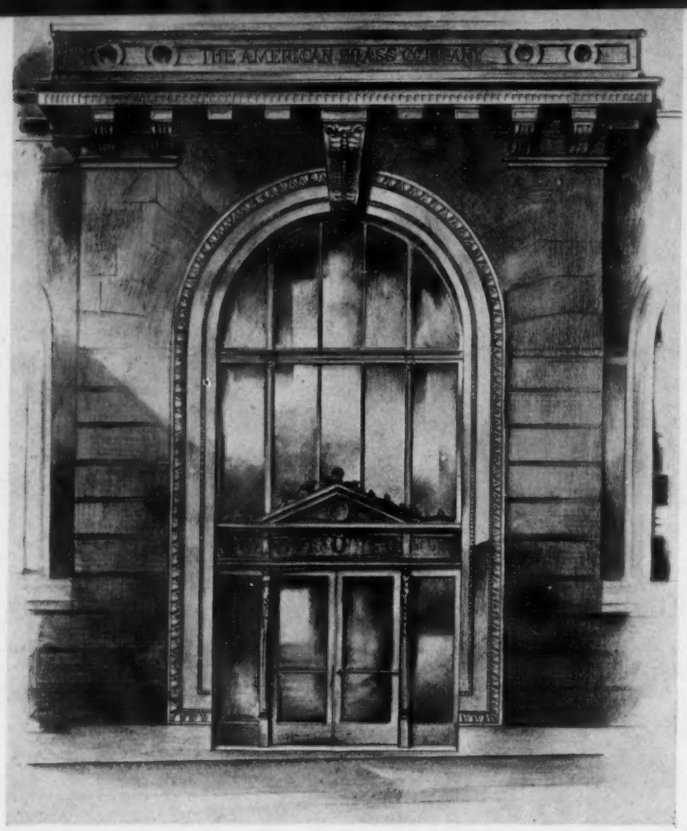
Applications, compositions, general physical constants, physical properties; fabricating procedures; oxy-acetylene and electric welding of copper and copper-alloys; weight tables and conversion factors; flow tables for pipe and tube; operating characteristics of copper bus conductors; etc., etc.

Read the brief description of these publications — then check off those you want on the convenient form provided on the following page. They will be mailed to you promptly and without cost.

THE AMERICAN BRASS COMPANY · **General Offices: Waterbury, Connecticut**

*Trade Mark Reg. U. S.Pat. Off.


Physical Properties
SHEET, PLATE AND STRIP
BARS AND SHAPES
HARD DRAWN WIRE
RODS
E-5 EVERDUR COPPER-SILICON ALLOYS
Contains applications, compositions, general physical constants on The American Brass Company's Copper-Silicon Alloys. Also physical properties for commercial shapes. 8 pages.
E-13 EVERDUR TANKS, EQUIPMENT
Welding properties and procedures for constructing unfired pressure vessels, storage tanks, heaters and other equipment. Formulae for determining plate thicknesses, etc. 20 pages.
E-1 EVERDUR CASTING INGOTS
Composition, general and physical properties of this copper-silicon casting alloy. Suggested foundry practice on charging, melting, molding, gating, pouring and machining. 8 pages.
FOUNDRY PRACTICE



MAKE THIS YOUR HEADQUARTERS

for Special Engineering Service on Copper and Copper-Alloys

The Technical Department of The American Brass Company is eager to assist those seeking helpful technical or engineering cooperation. In its never-ending quest for the most suitable and economical metals for specific applications, this Company has produced and tested hundreds of special copper-base alloys, many of which are now in common use for special types of service. Engineers of The American Brass Company also are prepared to cooperate with you in finding the correct solution for individual metal problems. This service is maintained for your convenience and its use entails no obligation on your part.

ANACONDA
from m[illegible]sumer

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Subsidiary of Anaconda Copper Mining Company
In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ont.*

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Check the publications desired, print your name and address and mail to us.

Name.....

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- ○ B-13. Anaconda Copper and Copper-Alloy Welding Rods
- ○ B-1. Anaconda Pipe, Copper Tubes and Fittings
- ○ E-6. Everdur Metal Bolts, Screws and Accessories
- ○ B-2. Anaconda Tubes and Plates for Condensers and Heat Exchangers
- ○ E-5. Everdur Metal Applications, Physical Properties and Constants
- ○ B-28. Anaconda Copper and Copper Alloys
- ○ C-25. Anaconda Copper Bus Conductors
- ○ E-13. Everdur Metal Tanks and Equipment
- ○ B-16. Tobin Bronze
- ○ B-21. Anaconda Beryllium Copper
- ○ E-1. Everdur Metal Casting Ingots
- ○ B-31. Anaconda Metals in the Aircraft Industry

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Today—as in the First World War—NORMA-HOFFMANN PRECISION methods and facilities are contributing accuracy, speed-ability, frictionless operation and dependability to practically every mechanical activity in the program of National Defense.

Day and night, the NORMA-HOFFMANN factory is turning out PRECISION BEARINGS that find their place in the machine tools and machinery producing essential equipment and supplies for army, navy and air forces; in battleships, cruisers, destroyers, submarines, aircraft carriers and other naval craft; in bombers, fighters, scout planes, trainers and transports; in anti-aircraft guns for land and naval operations; in gun mounts, gun-fire control and other ordnance equipment; in tanks and motor transport; and in telegraph, telephone, radio and photographic apparatus.

Submit YOUR bearing problems to us, for study and engineering recommendations—without obligation. Write for the Catalog.

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PRECISION BALL • ROLLER AND THRUST BEARINGS

Doall precision surface grinder employs super precision ball bearings carried in a forged, heat treated and ground quill of SAE 3140 steel. Spindle hole through spindle head is lapped to assure a perfect fit. Shown, with radius wheel dressing attachment, by Continental Machines Inc., 1301 Washington avenue South, Minneapolis

Booth No. G-6—No information available.

Booth No. H-6—Jackson Buff Co., Long Island City, N. Y., will exhibit in operation Airway ventilated buffs, automatic and hand buffing machines. Representatives: J. F. Harper, sales manager; A. T. Stafford, E. T. Flynn, representatives.

Booth No. H-6—Packer Machine Co., Meriden, Conn., will demonstrate No. 4-5 station rotary Packer-Matic polishing and buffing machine, No. 8500 oscillating wheel head, No. 424 continuous rotary-type Packer-Matic. Representatives: Kenneth Levenselor; Eugene Phillips; C. I. Packer, president.

Booth No. H-12—Johns-Manville, 22 East Fortieth street, New York, will exhibit insulating brick, fire brick and other products. Representatives: G. E. Grimshaw, manager Industrial Insulations Department, New York; C. E. Ernst; J. C. Crawford; E. J. Sullivan; G. V. Dutney; A. S. Charles; J. F. Heinberger; J. M. Watt; T. S. Nicely.

Booth H-13—No information available.

Booth No. H-17—No information available.

Booth No. H-16—John A. Roebling's Sons Co., Trenton, N. J., will exhibit round and flat wires, insulated wires and cables, woven wire fabrics, wire rope and fittings. Representatives: E. C. Low, general manager of sales; E. G. Hartman, manager of sales—round wire, flat wire and specialties; H. E. Thorn of Philadelphia, R. H. Clapp of New York, branch managers; D. Lewis, chief development engineer; H. C. Boynton, Wilbur Harvey, metallurgists; W. W. Williamson, special representative; Paul Karns, superintendent of flat wire division; E. H. Peplow Jr., manager of sales development; A. E. Gaynor, Robert Lewis, salesmen; F. J. Maple, manager of advertising.

Booth No. H-22—Drever Co., 748 East Venango street, Philadelphia, will exhibit samples of surface hardened stainless steel and photographs of furnace installations and ammonia dissociator.

Booth No. H-26—General Aniline & Film Corp., Ozalid Products Division, Johnson City, N. Y., will exhibit developing machines and demonstrate whiteprint machines including new model C. Representatives: E. V. Brewer, general sales manager; H. S. Sutton; J. A. Travis; and others.

Booth No. H-29—Summerill Tubing Co., Bridgeport, Pa., will exhibit a small draw bench in operation drawing small size tubing and making some shapes. Tubing and special shapes will be shown. Representatives: A. J. Williamson, chief metallurgist; Lloyd Zeigler, assistant metallurgist; C. D. Townsend, product research; G. E. Parker, general manager of sales; J. P. Dods, sales research engineer.

Booth No. H-31—No information available.

Booth No. H-30—Quigley Co. Inc., 56 West Forty-fifth street, New York, will exhibit insulating refractory brick, blocks, castables and lagging; high-temperature cements and refractory surfacing coatings; metal protective coatings; sealing compounds and detergents; Quigley precast insulating panels. Representatives: D. F. McMahon, executive vice president; H. C. Thayer, vice president and chief engineer; J. D. Lawrence, vice president in charge of export; R. J. Demaison, technical advisor; H. M. Miller, manager Philadelphia office; L. H. Roffe, I. L. Carr, representatives.

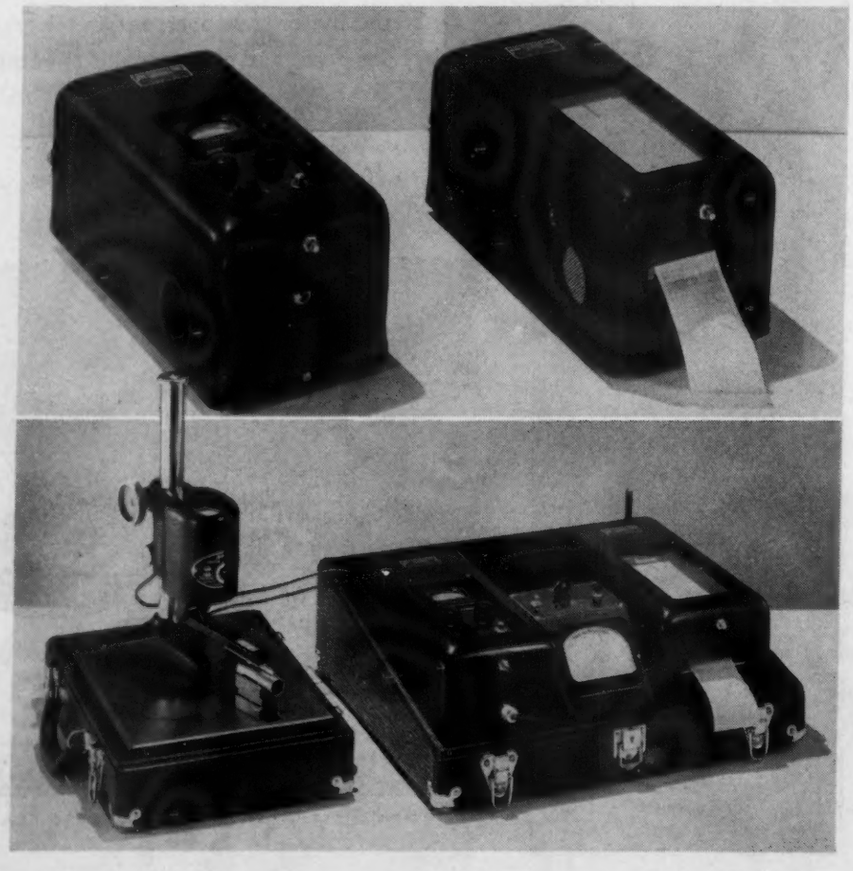
Booth No. H-35—Pulmosan Safety Equipment Corp., Brooklyn, N. Y., will exhibit new and improved devices for prevention of inhaling dust and fumes; other safety equipment. Representatives: Fred Wahlert, president; Bert Wetterholm, secretary; Frank Rodak, Karl Bahret, salesmen.

Booth No. H-37—Milburn Co., Detroit, will demonstrate new Ply No. 9 and show other protective creams and liquids designed to prevent industrial dermatitis. New Ply No. 9 also protects products against perspiration corrosion. Representatives: J. A. Stifter, president; G. M. Cole; D. Green.

Booth No. H-39—Eastman Kodak Co., Rochester, N. Y., will exhibit radiographs on new X-ray film, processing accessories, industrial photographs and photomicrographs. Representatives: Dr. H. E. Seemann; W. D. Kiehle; E. E. Smith.

Booth No. H-38—Bridgeport Brass Co., Bridgeport, Conn., will exhibit seamless tubing and other samples made of Dur-

Upper, direct inking oscillographs make instantaneous and permanent chart records of low frequency electrical alternations, surges, etc. Sensitivity up to 0.02 millimeter per peak volt; frequency range from 1 to 120 cycles per second; pens, up to three. Lower, surface analyzer makes instantaneous and permanent chart records of irregularities in finished surfaces at up to 40,000 magnifications, using tracer to follow surface. Irregularities of less than one millionth of an inch may be recorded accurately. Shown by The Brush Development Co., 3311 Perkins avenue, Cleveland



Linde Customers

Draw On This Large Library Of Oxy-Acetylene Process Information

THE Linde organization has made available a large library of oxy-acetylene process information on which customers can draw freely. The material in this Linde Library is designed not only to add to the knowledge of welding and cutting operators, but also to suggest to designers, engineers, and production men many ways in which Linde methods can be used to do better or quicker production work where the use of metals is involved. In addition, much of this literature is provided to suggest means of lowering the costs of maintenance work.

The Library consists of handbooks, instruction outlines, reprints of engineering articles, design data, safety folders and even a monthly "how-to-do-it" periodical, OXY-ACETYLENE TIPS. Among the many subjects covered are: oxy-acetylene welding, flame-hardening, flame-priming, flame-gouging, shape-cutting, stack-cutting, and hard-facing.

If you want to know more about how Linde helps its customers use Linde oxygen, Prest-O-Lite acetylene, and Union carbide effectively—get in touch with Linde today.

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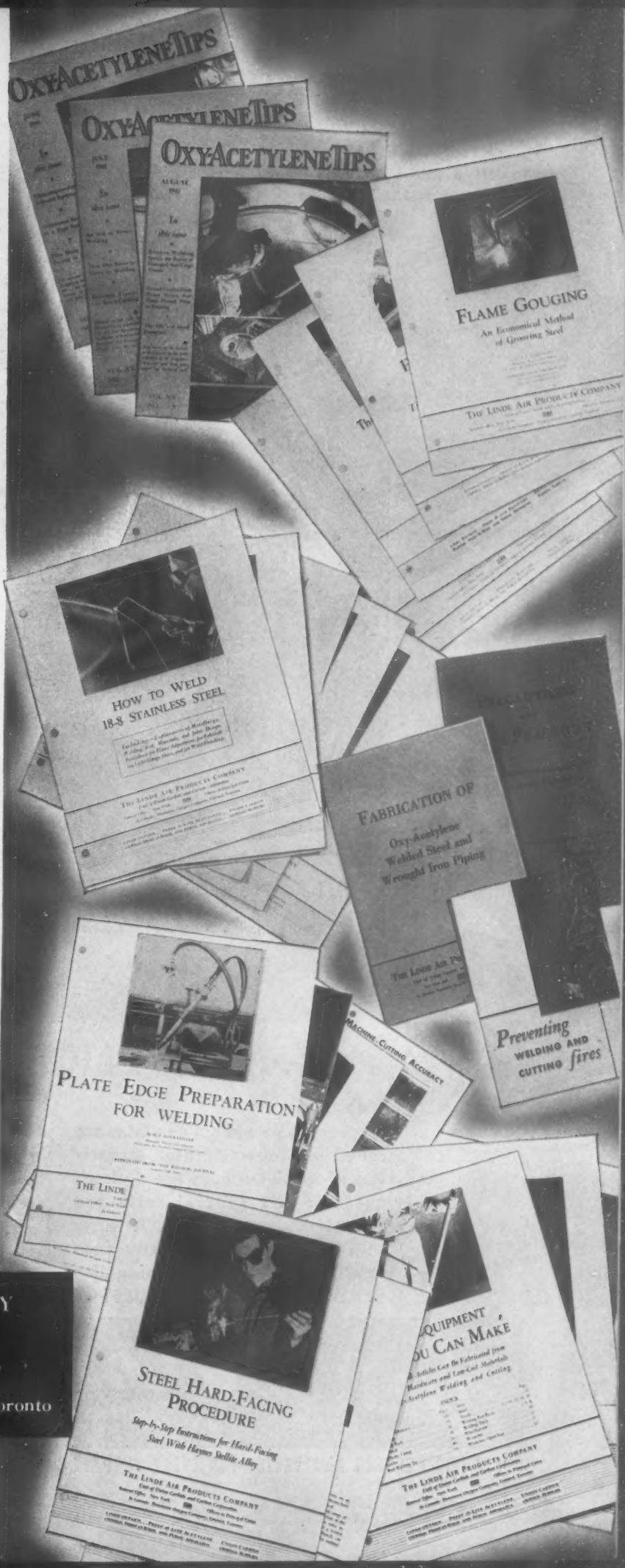
OXY-ACETYLENE TIPS
OXY-ACETYLENE TIPS
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FLAME GOUGING
An Economical Method of Grooving Steel
THE LINDE AIR PRODUCTS COMPANY
HOW TO WELD 18-8 STAINLESS STEEL
FABRICATION OF Oxy-Acetylene Welded Steel and Wrought Iron Piping
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PLATE EDGE PREPARATION FOR WELDING
MACHINE CUTTING ACCURACY
STEEL HARD-FACING PROCEDURE
Step-by-Step Instructions for Hard-Facing Steel With Haynes Stellite Alloy
THE LINDE AIR PRODUCTS COMPANY

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New York, Chicago, Birmingham, Kansas City,
San Francisco, and other Principal Cities
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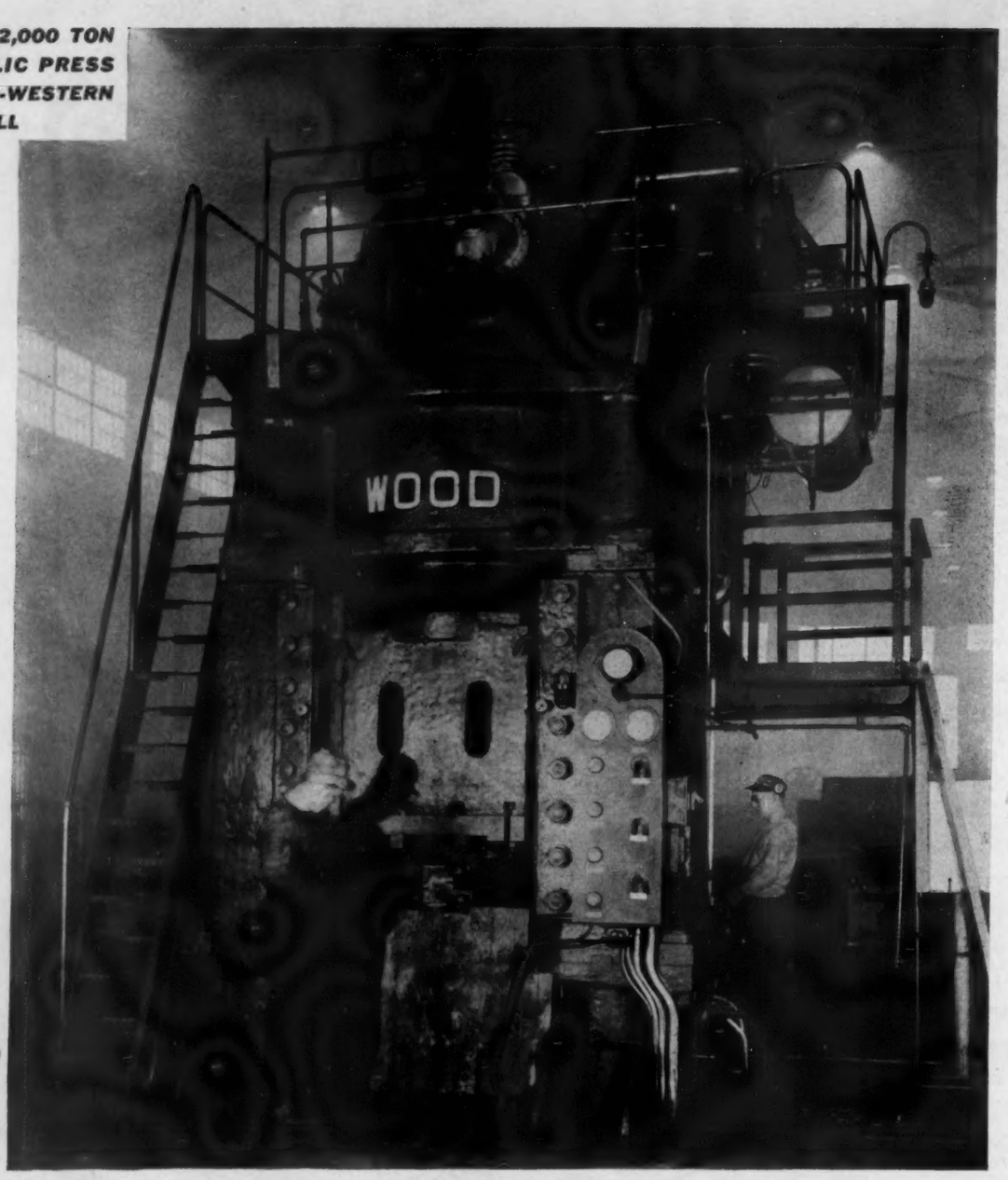
WOOD 2,000 TON HYDRAULIC PRESS IN A MID-WESTERN STEEL MILL



Real Savings... in SPLICE PLATE production

Of course railroad splice plates are rolled, but where limited quantities of special shapes are desired, costs of the special rolls are frequently prohibitive. A large mid-western steel company uses relatively inexpensive forming dies in a Wood 2,000 ton Hydraulic Press to solve this problem. They form a wide variety of splice plates from a few rolled shapes — with resulting low unit costs.

Throughout industry, Wood Hydraulic Presses and equipment are performing similar time, labor and money-saving services. There is a Wood standard or special press for every requirement and Wood engineers are always available for a discussion of your hydraulic press problems.

ESTABLISHED 1803

R.D. Wood Co.

PHILADELPHIA, PA.

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE

onze and other alloys. Representatives: H. W. Steinkraus, vice president; J. D. Burnham, district manager, H. F. Wageman, assistant district manager, Dave Snow, M. F. Pilger, Philadelphia office; J. A. Byrne, district manager, Atlanta office; R. Mommers Jr., Richmond; A. R. Zender, assistant sales manager, Bridgeport office.

Booth No. H-43—American Welding Society, 33 West Thirty-ninth street, New York, will sponsor an educational exhibit; McCune memorial plaque will be shown. Representatives: M. M. Kelly, national secretary; W. Spraragen, editor and technical secretary; L. M. Dalcher, assistant technical secretary; H. B. Seydel, chairman, local committee on Society booth.

Booth No. H-46—Superior Tube Co., Norristown, Pa., will demonstrate model draw bench showing cold-drawing of small sizes of tubing. Representatives: S. L. Gabel, general manager; R. H. Gabel, vice president; H. B. Brown Jr., sales manager; C. W. Buler, superintendent; A. M. Bounds, metallurgist; R. E. Funk, assistant to superintendent; W. C. Hanna, assistant to metallurgist.

Booth No. H-47—H. W. Butterworth & Sons Co., Bethayres, Pa., will exhibit rough and finished castings. Representatives: H. V. Witherington, manager foundry division; E. G. Beck, manager of sales.

Booth No. H-51—Charles R. Yerger Co. Philadelphia (Grob Brothers, Grafton, Wis.; Acme Industrial Co., Chicago) will exhibit in operation Grob Brothers die sawing and die filing machines; Acme Standard drill jig bushings, hardened and ground work and precision lapped flat surfaces. Representatives: C. R. Yerger; Theodore Grob; Benjamin Grob; A. M. Steelhammer; A. Gabriel.

Booth H-50—No information available.

Booth No. H-53—Welding Engineer Publishing Co., Chicago, will display publications and charts on welding. Representatives: T. B. Jefferson, editor; D. R. Watson, midwest advertising representative; T. E. Depew, eastern advertising representative; T. L. Lawless, Lee Plume, Robert Gaston, circulation representatives.

Booth No. H-54—No information available.

Booth No. H-58—No information available.

Booth No. H-59—Hild Floor Machine Co., 1313 West Randolph street, Chicago, will show in operation wet and dry floor scrubbing machine and pick-up vacuum. Representatives: F. C. Hild, president; F. N. Lyon, Sales manager; C. D. Jones of Pittsburgh; Russell Weiss of Philadelphia.

Booth No. G-61—Dow Chemical Co., Midland, Mich., will exhibit Dowmetal magnesium alloys; sand, permanent mold and die castings; sheet, strip and plate; extruded shapes; bars, rods and forgings; fabricated parts. Representatives: L. B. Grant, manager; O. E. Grant; G. W. DeKuiper; L. H. Stewart; J. C. H. Stearns; J. C. Mathes; D. T. Wellman.

New continuous-balance circular-chart potentiometer. Shown by The Brown Instrument Co., Philadelphia

Booth No. F-61—No information available.

Booth No. E-61—Stoody Co., Whittier, Calif., will exhibit unprotected and hard-faced equipment, hard-facing alloys, blast cleaning nozzles, wear-resistant castings. Representatives: J. R. Spence, general sales manager; George Griffin Jr., assistant sales manager; J. C. Bingman, sales engineer; G. F. Staley, advertising manager; K. B. Trapp.

Booth No. E-58—Philadelphia Electric Co., 1000 Chestnut street, Philadelphia, will illustrate uses of gas and electricity in defense industries, including melting and heat treatment of metals, gas in process heating and heat treating, etc. Representatives: C. E. Russell, A. D. Spillman, and others of sales department.

Booth No. E-54—Wells Mfg. Co., Three Rivers, Mich., will exhibit in operation Nos. 5 and 8 metal cutting band saws. Representatives: O. R. Ash, vice president; Lawrence Smallcombe, salesman; Taylor Simanton of Philadelphia, William Halpern of New York, factory representatives.

Booth No. E-50—Kuhlman Electric Co., Detroit Electric Furnace Division, Bay City, Mich., will exhibit Detroit electric furnaces, automatic control meter panel assembly, special furnace transformer. Representatives: G. I. Wright of Philadelphia, E. L. Moreland of York (Pa.), district agents; D. F. Potter Jr., manager New York office; E. C. Woodruff, service engineer; D. W. Boyd, sales and service department.

Booth No. E-44—Chas. F. L'Hommedieu & Sons Co., Chicago. No information available.

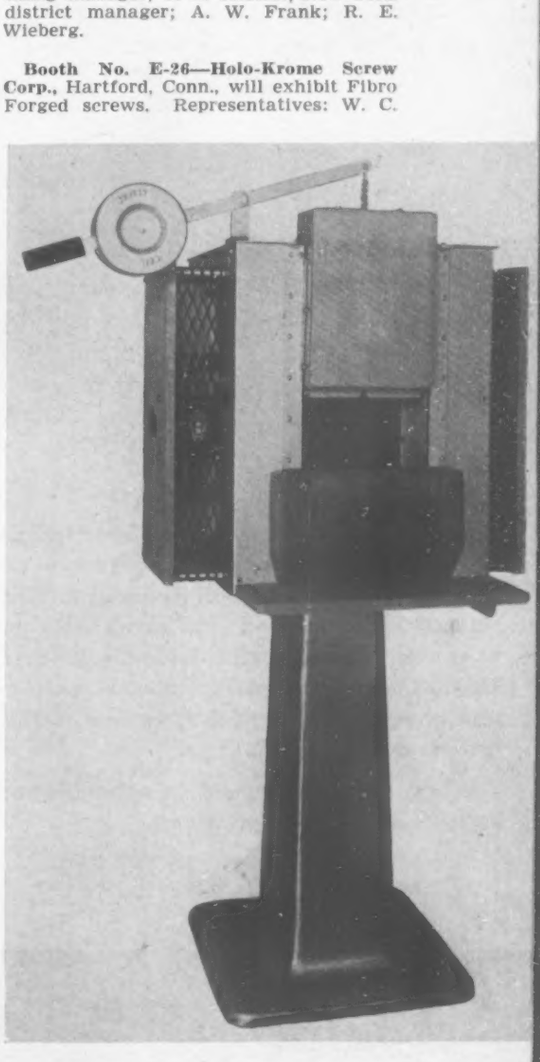
Booth No. E-42—Molybdenum Corp. of America, 3201 Grant building, Pittsburgh, will exhibit alloys and chemicals of molybdenum, tungsten and boron. Representatives: Marx Hirsch, president; Van Rensselaer Lansingh, E. A. Lucas (in charge of operations), W. H. Phillips (in charge of sales), vice presidents; N. F. Tisdale, metallurgical sales engineer; Earl Steward, western district sales manager.

Booth No. E-38—McKay Co., Pittsburgh, will demonstrate arc welding electrodes for mild steel and stainless metals. Representatives: J. C. McKay, vice president; M. J. Van Dreser, manager sales and engineering, Electrode Division; Vincent Risley, J. C. Hendrickson, E. G. Fielding, C. R. Carlin, sales staff.

Booth No. E-34—Carboloy Co. Inc., Detroit, will exhibit applications of carbides for wear-resisting purposes including punch and forming dies, extrusion dies, seats for valves, standard tools and tips.

Booth No. E-30—Hevi Duty Electric Co., 4212 West Highland boulevard, Milwaukee, will exhibit laboratory furnaces and photographs of industrial furnaces. Representatives: A. H. Oberndorfer, advertising manager; G. A. Chutter, New York district manager; A. W. Frank; R. E. Wieberg.

Booth No. E-26—Holo-Krome Screw Corp., Hartford, Conn., will exhibit Fibro Forged screws. Representatives: W. C.



New high-speed-steel hardening furnace with controlled atmosphere accommodates tools up to 4¾ x 4⅞ x 11 inches. Steel shell of furnace is insulated for 2000-degree Fahr. operation. Muffle is removable. Uses Globar electric heating elements rated 22½ kilowatts total. Normal operation ranges from 5 to 15 kilowatts per hour. Heats from cold to 2350 degrees Fahr. in 75 minutes. Shown by Sentry Co., Foxboro, Mass.

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TRACTORS

TRAINS

TRUCKS

The care, skill, and enormous plant facilities which produce this nationally known and extensive line of Russell, Burdsall & Ward threaded and headed products assure you of uniform quality and accuracy in every EMPIRE Bolt, Nut, and Threaded Fastening—and smooth, swift facilities to make possible greater defense production.

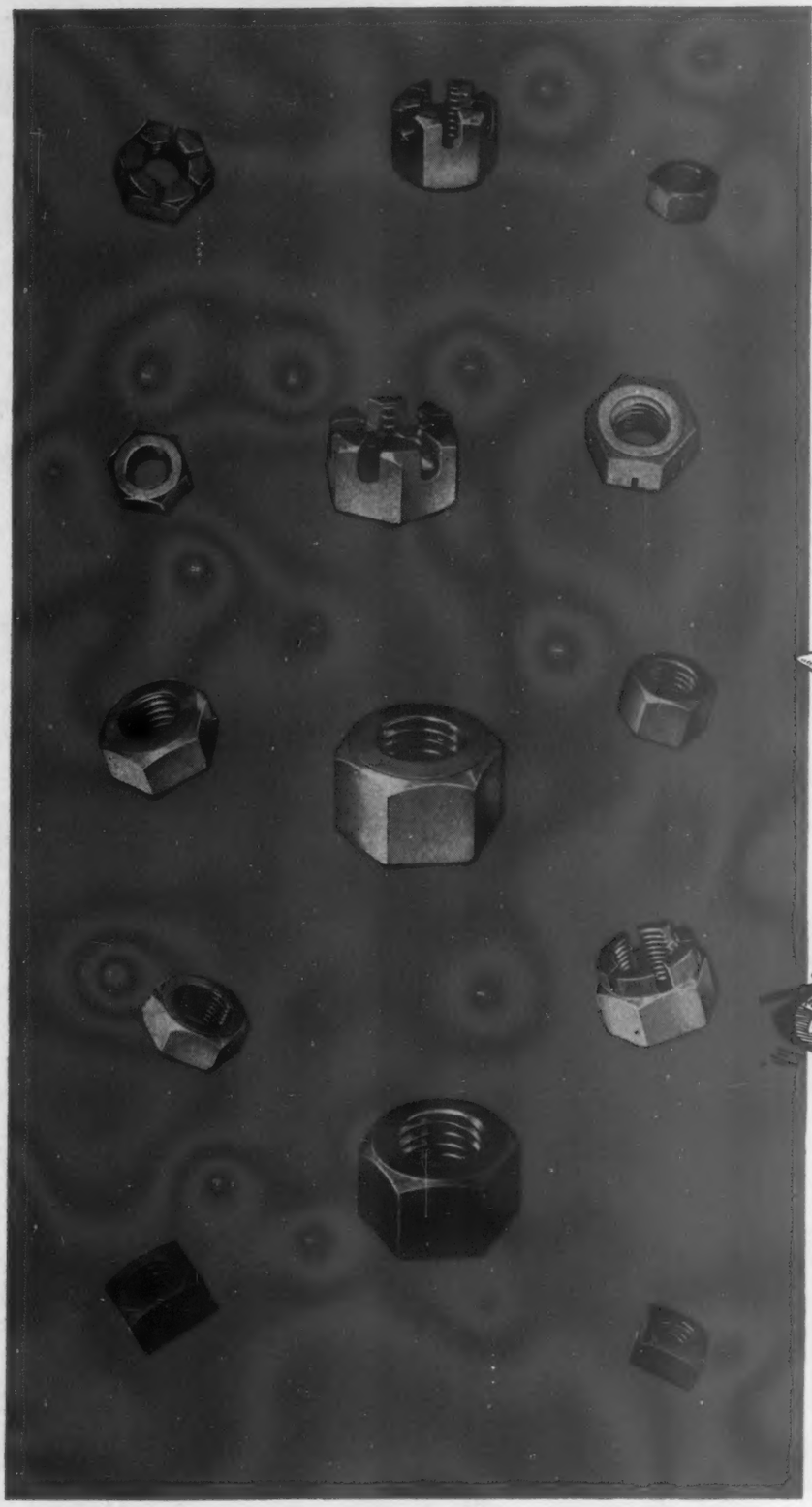
When you want speed in assembly, use EMPIRE Bolts, Nuts and Rivets.

BOLTS EMPIRE NUTS-RIVETS

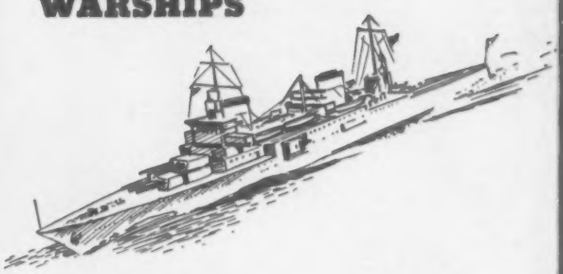
RUSSELL, BURDSALL & WARD
BOLT AND NUT COMPANY

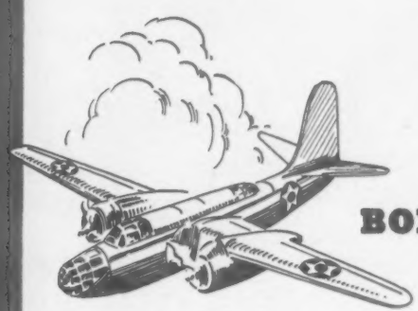
PORT CHESTER, N. Y. ROCK FALLS, ILL. CORAOPOLIS, PA.

VARIETY OF FASTENING NEEDS

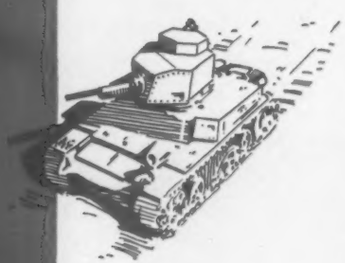


WARSHIPS





BOMBERS



TANKS

OUR PART

Probably there is no single item made by American Industry more generally used in all defense products than bolts and nuts, rivets and other industrial fastenings. A billion dollars worth of castings, forgings, stampings, engine parts, can be of no use to the defense program unless there is available a necessary supply of such fastenings. It is our problem to produce these vital products in record-breaking tonnage, so that no interruption may occur in the assembly of that vast array of materials required for the Arsenal of Defense. To that task we direct the full energies of the entire R B & W organization in our three strategically located plants.

830

BOLTS: Carriage - Machine - Lag - Plow - Stove - Elevator - Step - Tap - Wheel & Rim - Battery - U-Bolts - Tire - Automotive - Drilled - Faced - Special Heat Treated, etc. - **NUTS:** Cold Punched - Semi-Finished - Hot Pressed - Case Hardened - Slotted - Castle - Machine Screw - Marsden Lock - Low Sulphur - **RIVETS:** Standard - Tinners' - Coopers' - Culvert - Clevis and Hinge Pins - **SCREWS:** Cap - Machine - Hanger - Sheet Metal - Phillips Recessed Head - **WASHERS:** Plate - Burrs - **MATERIALS:** Steels - Alloys - Brass - Bronze - Naval Brass - Everdur - Herculoy - and others - **RODS:** Stove - Seat - Ladder - **PLATED PARTS:** Cadmium - Zinc - Chromium - Nickel - Hot Galvanized - Copper - Tin - **SPECIAL UPSET & PUNCHED PRODUCTS.**

New high speed developing machine used with model 75 BW printer—one operator handles both printing and developing at speeds from 0 to 25 feet per minute. Machine is fully automatic, uses positive vacuum separator principle. Shown by Charles Bruning Co., Inc., 42-33 Ninth steet, Lang Island City, N. Y.

Stauble, vice president; G. W. Schwager; sales representatives.

Booth No. D-6—Bethlehem Steel Co., Bethlehem, Pa., will demonstrate spectrographic analysis of steel, spark testing, fracture testing of heat-treated bearing steels, wire rope testing. Motion pictures will show sheet-strip mill in operation and manufacture of wire rope. Representatives: Members of the Central Metallurgical Department; Research and Development Department; Sales Department at the home office, Philadelphia office; Bethlehem plant; Cambria plant; Lackawanna plant; Maryland plant; Fore River Shipbuilding plant; Advertising Department.

Booth D-21—Manganese Steel Forge Co., Richmond street and Castor avenue, Philadelphia (Audubon Wire Cloth Corp., same address), will exhibit double crimped woven wire cloth, operating conveyors and Metalwove belts, 11-14 per cent Rol-Man manganese steel forged, rolled and pressed products. Representatives (Manganese Steel Forge Co.): L. W. Jones Jr., president; R. J. Guba, general manager; E. L. Pemberton of New York; M. S. Dennett of Detroit; W. S. Yates of Chicago; L. R. Cartwright of Indianapolis; (Audubon Wire Cloth Corp.): Above, plus P. A. Rand of Boston, H. W. Paret Jr. of Pittsburgh.

Booth No. D-23—American Brake Shoe & Foundry Co., American Manganese Steel Division, Chicago Heights, Ill., will exhibit Amsco alloy heat resisting castings, Hoffman Flexbox sectionalized container and Amsco reclamation and hard surfacing welding materials, with arc welding equipment in operation. Representatives: J. B. Terbell, vice president; W. C. George, sales engineer; W. G. Atkinson, sales representative; W. G. Hoffman, manager, and E. A. Lerner, assistant manager, alloy department; E. L. Quinn, manager, and D. B. Rice, assistant manager, welding products division.

Booth No. D-29—American Machine & Metals Inc., Riehle Testing Machine Division, East Moline, Ill., will demonstrate new universal screw power testing machine and hydraulic brinell hardness tester and standard testing machines. Representatives: E. R. Glenn, Philadelphia district engineer; William Printz of New York; A. F. Green of Hartford; C. A. Hogentogler Jr. of Washington; R. A. Armstrong of Cleveland; R. H. Herring, sales and service engineer; Alfred Sonntag, chief engineer and sales manager.

Booth No. D-26—International Nickel Co. Inc., 67 Wall street, New York, will sponsor a conference space where information on nickel and nickel alloys may be obtained. Representatives: Members of Development and Research Division, Monel and Rolled Nickel Department, Nickel Sales Department.

Booth No. D-31—Maurath Inc., 7309 Union, Cleveland. Reception Lounge. Pictorial display.

Booth No. D-35—Armstrong Cork Co., Lancaster, Pa., will exhibit fire brick, diatomaceous earth and asphalt products. Representatives: F. W. Muller, general manager, high temperature department; E. E. Tanguy, manager, Baltimore office; D. C. Callis, W. R. Kerr, research and development specialists; M. A. Hopf, sales department, Lancaster; J. G. Seanor of Chicago, B. W. Adams of Cleveland, F. H. Blythe of Philadelphia, L. W. Bertelsen of Pittsburgh, S. M. Jenkins of New York, salesmen.

Booth D-36—Republic Steel Corp., Republic building, Cleveland. Lounge and pictorial display.

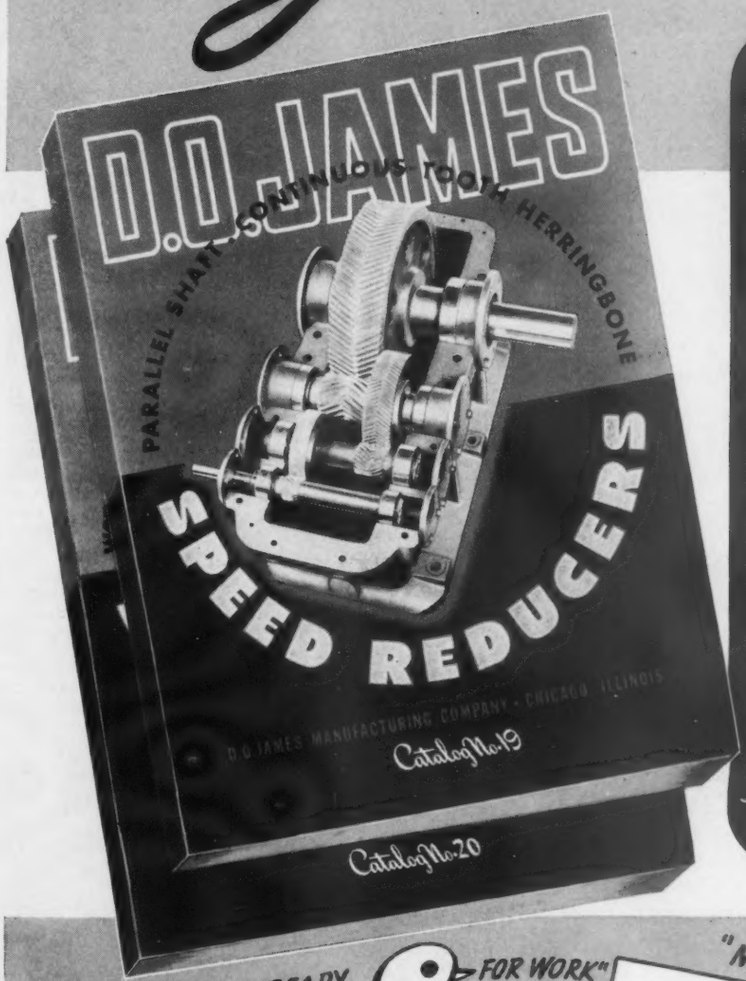
Booth No. D-39—Hobart Brothers Co., Troy, O., will exhibit in operation "Sim-

Men and munitions are protected in shelters such as this which will be shown by American Rolling Mill Co., Middletown, O. Main section of shelter is formed from 7-gage Armco Multi Plate corrugated sheets. End walls are out-flanged channel sections fabricated from 11-gage galvanized Armco Ingot Iron sheets

PRODUCTION SCHEDULES

ARE SAFELY MAINTAINED WITH

D.O.James Geared Drives



The vital need of "On Time" Production necessitates the correct and quickest means of engineering your gear reducer requirements.

Our past experience has proven the value of catalogs for specific types of reducers — present day requirements enhance their value to you and ourselves.

WE WILL GLADLY SEND YOU COPIES OF CATALOG No. 19... containing 48 pages of complete engineering data, examples of use and prices of the D.O. JAMES parallel shaft continuous-tooth herringbone gear speed reducers.

CATALOG No. 20... covering complete information on the D.O. JAMES worm, motorized worm, helical worm and double worm gear speed reducers.

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D.O. JAMES MANUFACTURING CO.
1120 W. Monroe Street, Chicago, Illinois.

Messrs. Catalog No. 19 and No. 20—Come at once, ready for work—Our "On Time" Production Department wants to look you over.

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MANUFACTURING COMPANY, 1120 W. MONROE STREET, CHICAGO

FOR OVER FIFTY YEARS MAKERS OF EVERY TYPE OF GEAR AND GEAR REDUCER

CARBON TOOL STEELS · ALLOY TOOL STEELS
CORROSION AND HEAT-RESISTING STEELS
NITRALLOY STEELS · STAINLESS STEELS
FREE CUTTING STAINLESS STEELS

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

The Copperweld Steel Company is producing the following Aristoloy Steels particularly for National Defense: RIFLE AND GUN BARREL QUALITY, GUN QUALITY, SHOT QUALITY, BULLET CORE AND AIRCRAFT QUALITY.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

COPPERWELD STEEL COMPANY WARREN, OHIO

See us at the
METAL SHOW
Philadelphia, Pa.
Oct. 20-24, 1941

ARISTOLOY STEELS

STAINLESS STEELS, CORROSION AND HEAT RESISTING STEELS, CARBON TOOL STEELS, ALLOY TOOL STEELS, SPECIAL AND FINE STEELS, NITRALLOY STEELS, AIRCRAFT QUALITY STEELS, BEARING QUALITY STEELS

plified" arc welders with both gasoline and electric drive. Representatives: E. A. Hobart, president; W. H. Hobart, vice president; O. H. Menke, production manager; W. J. Chaffee, E. K. Butterfield, welder sales; R. C. Bercaw, demonstrator; D. C. Anderson, factory distributor, Philadelphia; Walter Humphreys, Dave Humphreys, Dave Little, Philadelphia sales.

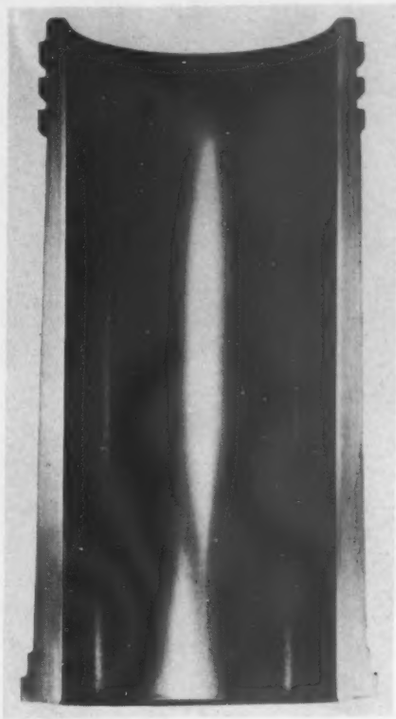
Booth No. C-46 — Pangborn Corp., Hagerstown, Md., will demonstrate Roto-blast cleaning barrel and table with dust collector and also suction air blast cabinets. Cleaning 105-millimeter shell in blast cleaning cabinet will be featured. Representatives: V. F. Stine, vice president; A. L. Gardner, advertising manager; J. H. Connolly of New England, W. F. Jones of New York, F. G. Sharpe of Philadelphia, R. M. Trent of Pittsburgh, B. R. Artz of Syracuse, district managers.

Booth No. D-55—McKenna Metals Co., Latrobe, Pa., will exhibit new round shank Kennametal boring tools, steel cutting carbide tools, blanks and wear resisting parts. Representatives: P. M. McKenna, senior partner; W. L. Kennicott, assistant manager; Walter Greenleaf of western Pennsylvania, R. B. Weeks of Chicago, J. A. Deakin of New York, John Roney of Detroit, G. G. Thompson of Illinois, C. M. Wheelock of Wisconsin, A. M. Kebe of Ohio, P. A. Patterson of Philadelphia, George Raible of Cincinnati, E. M. Kimball of Connecticut, B. E. Middleton of upper New York state, district representatives; John Wilcox, Herb Braun, Joe Gabrig, J. M. Roberts, sales representatives.

Booth No. D-56—Great Lakes Steel Corp., Ecorse, Mich. No information available.

Booth No. D-61—American Foundry Equipment Co., Mishawaka, Ind., will exhibit airless Wheelabrator Tumblast and Multi-Tablast ventilated by Dustube dust collector, and finishes obtainable with them. Representatives: O. A. Pfaff, president and general manager; L. L. Andrus, vice president in charge of sales; A. E. Lenhard, advertising manager; C. L. Benham, James Rigby, district sales managers.

Cast iron cylinder liners of Caterpillar diesel engines have their bores hardened by induction heating equipment developed by Budd Induction Heating Inc., subsidiary of Budd Wheel Co. of Detroit. Note how depth of hardened zone is controlled along length of lining as desired



Booth No. D-57—No information available.

Booth No. C-58—Lewis Machine Co., 3441 East Seventy-sixth street, Cleveland, will exhibit No. 4-F Travel-Cut wire-straightening and cutting machine. Representatives: M. W. Lewis, president; C. B. Jones, western sales representative; E. P. Moslo, central sales representative; G. M. Hessdoerfer, eastern sales representative.

Booth C-61—P. A. Patterson Co., Philadelphia. No information available.

Booth No. C-57—Kelley-Koett Mfg. Co., Chicago. No information available.

Booth No. C-55—Radium Chemical Co. Inc., 570 Lexington avenue, New York, will exhibit radium radiographs of castings, welds and miscellaneous material; apparatus for nondestructive testing; types of radium capsules; film holders, lead containers; operating technique. Representatives: J. A. Kelly, president; G. T. Taylor, vice president; R. V. Lange, sales manager; P. D. Johnson, sales representative.

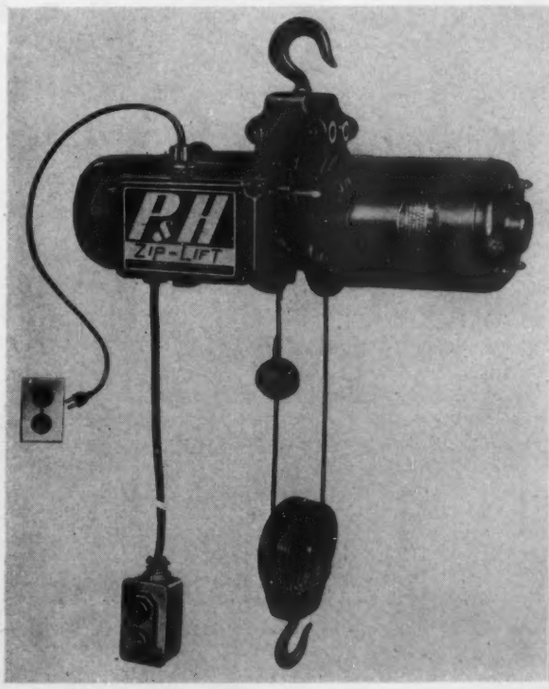
Booth No. C-56—Agfa Ansco Corp., Binghamton, N. Y. No information available.

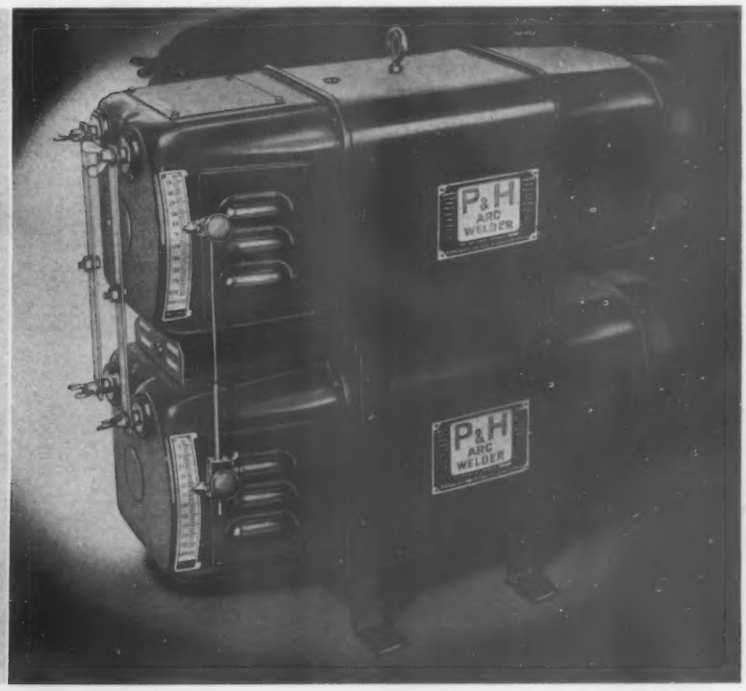
Booth No. C-54—Alvey Ferguson Co., 75 Disney street, Cincinnati. No information available.

Booth No. C-51—Coffing Hoist Co., Danville, Ill., will exhibit in operation ratchet lever, spur gear and electric hoists. Representative: E. J. Heinen, district sales manager.

Booth No. C-49—Kent Co. Inc., Rome, N. Y., will exhibit C15 wet scrubber and

Left, Zip-Lift hoists range in capacity from 250 to 2000 pounds and are adaptable for all types of mountings. Right, Model WE—150-ampere, stationary, multiple unit, electric-motor-driven arc welders. Shown by Harnischfeger Corp., Milwaukee





DEFENSE INDUSTRY..

Practically every weapon—and every tool for making weapons—every machine—every means of transportation and communication—every implement of factory, mine or farm—contains alloys or materials processed by alloys—alloys of which the Vanadium Corporation is one of America's principal producers.

VANADIUM

CORPORATION OF AMERICA • NEW YORK, N. Y.

• **VANADIUM**— an indispensable alloy in high speed steels that carve out guns, gears, shafts, armor plate—an element in the finest springs and in heavy steel castings of high quality—essential in many of the best forging steels for both heavy and light sections—contributes strength, toughness, ductility, resistance to impact, wear resistance, uniform internal structure, machinability, weldability—simplifies heat treatment, inhibits grain growth, adds hot hardness—

• **CHROMIUM**—hardener of steels and irons—essential element in all stainless steels—principal alloy of the SAE 5100 series—partner with other alloys in a long list of the best forging and structural steels—goes into practically every field—shafts, gears, structural tubing, heat-resistant tubing and castings, chemical equipment, cylinder blocks, springs, automotive and aircraft forgings—

• **SILICON** — deoxidizer and degasifier in open hearth, bessemer, crucible and electric steels—graphitizer in cast irons

—essential alloy in many sheets and other shapes for electrical applications — major component of many spring, tool and corrosion-resistant steels — minor component of all carbon and alloy machinery, automotive and aircraft steels—is the leading tonnage alloy of 1941—

• **ALSIFER** — (aluminum silicon iron alloy) — deoxidizer for all quality steels—perfect addition for the production of fine-grained steels—contributes uniformity of hardness and control of grain size, gives higher aluminum efficiency—

• **TITANIUM**—deoxidizer and cleanser in rimming steels — gives smoother surface and freedom from sub-surface defects in sheets and other rolled shapes—as deoxidizer, scavenger, and alloying element, is added to steel castings, fully killed ingot steels—in high chromium corrosion-resisting steels, is a carbide stabilizer—

• **GRAINAL ALLOYS**—ladle or ingot additions that greatly increase hardenability even in fine-grained steels—usually increase hardenability, toughness and impact resistance simultaneously—make carbon and alloy steels usable in larger sections—

• **V - FOUNDRY ALLOYS**—(chromium silicon manganese alloys)—reduce depth and variation in depth of chill in cast iron—stabilize and slightly increase tensile strength — improve machinability with same or slightly increased hardness—eliminate hard spots—

• **GRAPHIDOX** — graphitizer in cast irons—powerful agent, even in very small quantities, for converting white into gray iron—eliminates hard spots, reduces and stabilizes chill depth in plain or alloy irons — provides unusual control where properties must be improved without increase in hardness—

• **SPECIAL ALLOYS** — to meet individual requirements.

BVD

FERRO ALLOYS

electric mopper in operation, dry scrubber, vacuum cleaner. Representatives: M. G. Steele, factory manager; E. P. Wittschiebe of New York, G. W. Blanchard of Washington, P. V. Hugues of Philadelphia, branche managers; J. E. Heath, Paul Young, Richard Bauchmoyer, Don Smith, P. T. Hugues, salesmen.

Booth No. B-46—Continental Machines, 1301 Washington avenue south, Minneapolis, will exhibit new G-6 surface grinder and job selector dial, Doall contour sawing machines, filing and polishing machines, all in operation. Representatives: D. A. Morelnis, chief engineer, Doall Eastern Machine Co.; M. A. Singer, E. P. Poole, assistant engineers, Philadelphia branch; J. M. Dillon, assistant engineer, Hartford branch.

Booth No. B-42—No information available.

Booth No. C-40—Handy & Harman, 82 Fulton street, New York, will demonstrate brazing with Sil-Fos and Easy-Flo alloys. Representatives: F. T. VanSyckel, advertising manager; Leo Edelson, development engineer; F. Petrie, research laboratory; J. C. Powers Jr., A. W. Swift, salesmen.

Booth No. C-38—Ecco High Frequency Corp., 120 West Twentieth street, New York, will exhibit high-frequency induction heating equipment, with a high-frequency converter in operation. Representatives: E. R. Capita; J. Vanura; T. A. Feehan.

Booth No. C-39—No information available.

Booth No. C-35—No information available.

Booth No. C-34—C. I. Hayes Inc., Providence, R. I. No information available.

Booth No. C-30—A. P. De Sanno & Son, Phoenixville, Pa., will exhibit in operation Radiac cut-off machines types K and M. Representatives: Vincent Colajezzi, B. G. Hardy, S. G. Scheirer, engineering department; C. H. Davis, special representative; N. A. Conway Jr., advertising manager; L. R. Burnes, F. B. Soulas, district sales representatives.

Booth No. C-31—No information available.

Booth No. C-28—Canadian Radium & Uranium Corp., New York, will exhibit equipment used in connection with making of radiographs with radium. Representatives: Boris Pregel, president; A. J. Pregel, vice president; H. B. Kearney, sales manager (in charge); J. S. Harris, Frank Hartman, representatives.

Booth No. C-26—No information available.

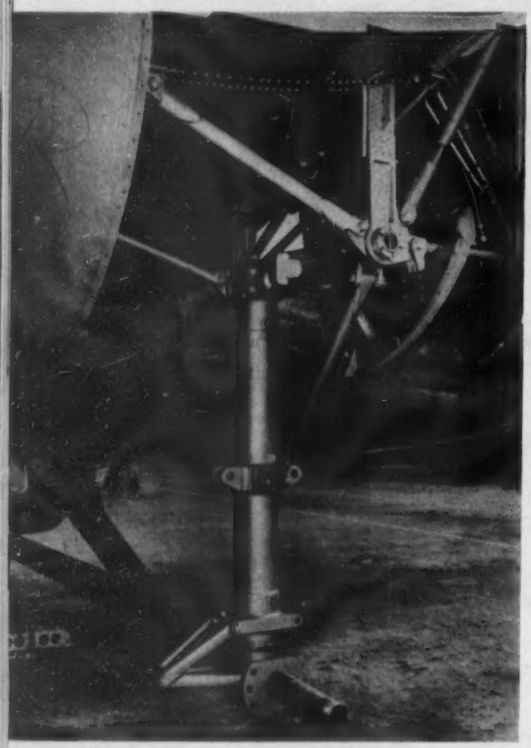
Booth No. C-22—Office of Production Management, Division of Contract Distribution. Service to bring together prime contractors and subcontractors.

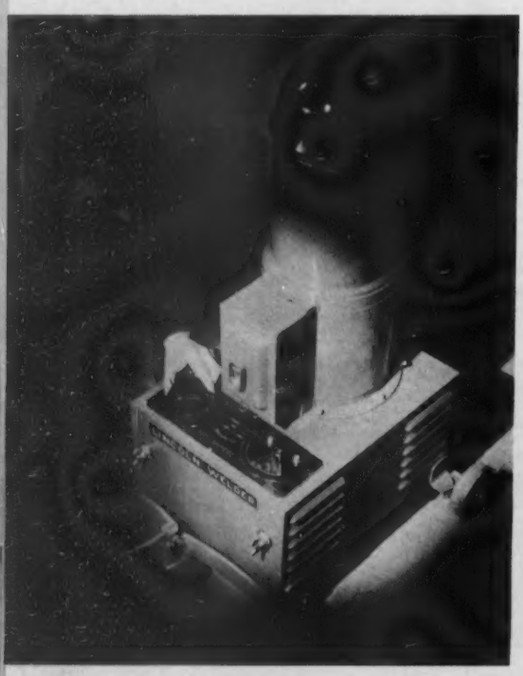
Booth No. C-21—Independent Pneumatic Tool Co., 600 West Jackson boulevard, Chicago, will exhibit in operation portable electric drills, screwdrivers, nut setters, tappers, grinders, sanders and polishers, saws, hammers and belt sanders. Representatives: N. C. Hurley Jr., W. A. Nugent, vice presidents; J. A. Hill of Philadelphia, E. R. Wyler of New York, managers; F. H. Charbono; J. B. Dempsey; E. R. Gee; V. G. Turner; Lewis Abbott; E. Hammett; W. D. Trainor.

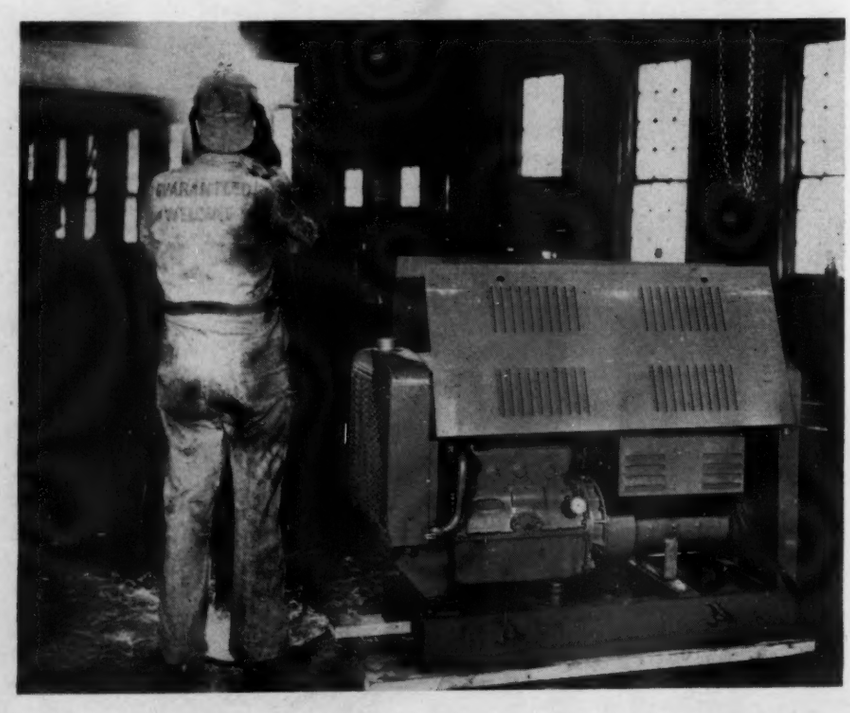
Booth No. C-17—Cambridge Wire Cloth Co., Cambridge, Md., will exhibit woven wire cloth, screens, conveyor belts, crates and baskets, fabricated wire products; and in operation a conveyor with mesh belt. Representatives: F. L. Hooper, assistant to the president; E. N. Evans, sales manager; E. D. Steck, E. F. Learned, H. E. Pink, sales engineers; R. E. L. Mowbray, development division.

Booth No. C-13—Industrial Press. No information available.

Booth No. C-6—Yale & Towne Mfg. Co., 4530 Tacony street, Philadelphia. No information available.







Top, this aircraft landing gear was arc welded with the new Lincoln Planeweld electrodes to be demonstrated at the 1941 National Metals Exposition. Bottom left, Lincoln Electric Co., Cleveland, will also show its new 150-ampere Aircraft arc welder—a unit developed expressly for use in manufacture of planes. Lower right, the new 200-ampere gasoline-engine-driven arc welder to be shown by Lincoln is said to be light in weight, of small size and low cost for its capacity

Tanks enough for an Armored Division..

FROM STEEL SAVED EVERY MONTH BY RODINE

Lumbering monsters . . . Mediums mounting 75's, Light Tanks bristling with machine guns—

And *Rodine*, in the world's pickling baths last year, *saved steel enough monthly to equip a whole armored division!*

Conservation of steel is the fastest, first step to increased production. *Rodine saves* the steel normally lost by acid attack in pickling. This internationally accepted Selective Control Chemical lowers consumption of acid, cuts down time and labor required to charge vats, reduces acid brittleness, blistering, corrosion, eliminates formation and escape of poisonous acid mist.

American Chemical Paint Company, with more than 20 years' experience in the development of chemicals for *saving* and *protecting* steel, offers you the experience of their research and manufacturing facilities to conserve steel. Adequate stocks are available to meet your demands. Write for Bulletin No. 13.

AND THIS EFFICIENT ACID CLEANER DEOXIDINE, another ACP product, removes oil, eradicates rust, neutralizes rust producers and creates an etched, passive surface that holds paint perfectly.

RODINE *Saves* STEEL

AMERICAN CHEMICAL PAINT CO.

MAIN OFFICE AND WORKS
AMBLER · · · PENNA.

CHEMICALS ACP PROCESSES

DETROIT, MICH., 6339 Palmer Ave., E.
CANADIAN BRANCH
WALKERVILLE · · · ONT

Booth No. C-11—No information available.

Booth No. B-6—Copperweld Steel Co., Warren, O., will exhibit special quality tool and electric furnace alloy steels. Representatives: W. J. Buechling, chief metallurgist; R. S. Clingan, Chicago district sales manager; N. L. Deuble, manager of sales; R. A. Karr, metallurgist; Paul Keller, Cleveland district sales manager; R. B. Kropf, field metallurgist; E. D. Kennedy, advertising manager; F. L. Lawrence, Detroit district sales manager; R. G. Willaman, New York district sales manager; S. D. Williams, executive vice president.

Booth No. B-10—N. Ransohoff Inc., Elmwood, Cincinnati, will exhibit photographs of various cleaning equipments and parts cleaned.

Booth No. B-12—Wickwire Spencer Steel Co., 500 Fifth avenue, New York, will exhibit wire products including Wissco metal conveyor belts; torsion, extension, compression, coil, flat, motor and clock springs and wire forms; high and low-carbon wires; industrial wire cloths, perforated metals, wire rope, welded fabric and chain link fence. Representatives: F. W. Hale, sales manager mechanical specialties; M. G. Werme, plant superintendent; K. A. Zollner, advertising manager; A. G. Goldsmith, district manager; F. A. Hayward, F. M. Whitney Jr., A. J. Gillis, M. G. Butler, salesmen; V. C. King, A. Ambruson, belt engineers.

Booth No. B-13—Raybestos-Manhattan Inc., Manhattan Rubber Mfg. Division, Passaic, N. J., will demonstrate new Jacobsen Lightning Cut wet abrasive cut-off machine featuring new method of applying coolant to cutting wheel.

Booth No. B-17—Ransome Concrete Machinery Co., Dunellen, N. J., will demonstrate welding positioner with 2500-pound capacity and positioner having 8-ton capacity at 12 inches rating. Representatives: W. Muller, president; L. R. Wilson, vice president and manager of truck mixer division; A. P. Robinson, vice president and sales manager; G. F. Monagnan, advertising manager; J. C. Lukas, manager, industrial division; R. Garretson, industrial sales representative.

Booth No. B-16—Cleveland Overall Co., 1768 West Twenty-fifth street, Cleveland, will exhibit samples of garments and emblems used in Safety Garment Service; new ladies' coverall. Representative: R. A. Hoge.

Booth No. B-22—Bradley Washfountain Co., North Twenty-second and West Michigan streets, Milwaukee, will exhibit Multi-Stall showers and Washfountains, with one Washfountain in operation. Representatives: Alec Hicks; A. A. Hicks; R. G. Owen.

Booth No. B-26—No information available.

Booth No. B-29—Black Drill Co., 5005 Euclid avenue, Cleveland, will exhibit Hardsteel drills with operating drill press, bench grinder and rockwell hardness tester. Representatives: L. G. Black, president; F. G. Gepfert, director of sales; J. R. Novotny, general superintendent.

Booth No. B-31—Andrew King, Narberth, Pa., will demonstrate portable brinell hardness tester and new folding brinell microscope. Representatives: Andrew King; W. L. Jobe, assistant.

Booth No. B-30—No information available.

Booth No. B-34—No information available.

Booth No. B-33—Steel Publications Inc., 108 Smithfield street, Pittsburgh, will exhibit publications. Representatives: D. N. Watkins, president; N. R. Moll, vice president of sales; Charles Longenecker, managing editor, vice president; W. N. Robinson, editor; H. M. Reich, western manager; T. B. Little, eastern representative; F. B. Yeager, field representative.

Booth No. B-35—American Watchman's Time Detector Co., 17 East Forty-second street, New York (Morse Magneto Clock Co., same address), will exhibit Morse tape clock which gives positive record of time and order in which watchman's stations are visited. Representatives: J. S. Morse, treasurer; G. S. Krom, vice president.

Booth No. B-37—Andresen Inc., No information available.

Booth No. B-39—Allen Mfg. Co., Hartford, Conn., will exhibit hollow set and Pressur-Formd cap screws and a vibrating machine in operation to show their holding power. Representatives: C. J. Meister, field sales manager; W. D. Horner, district representative.

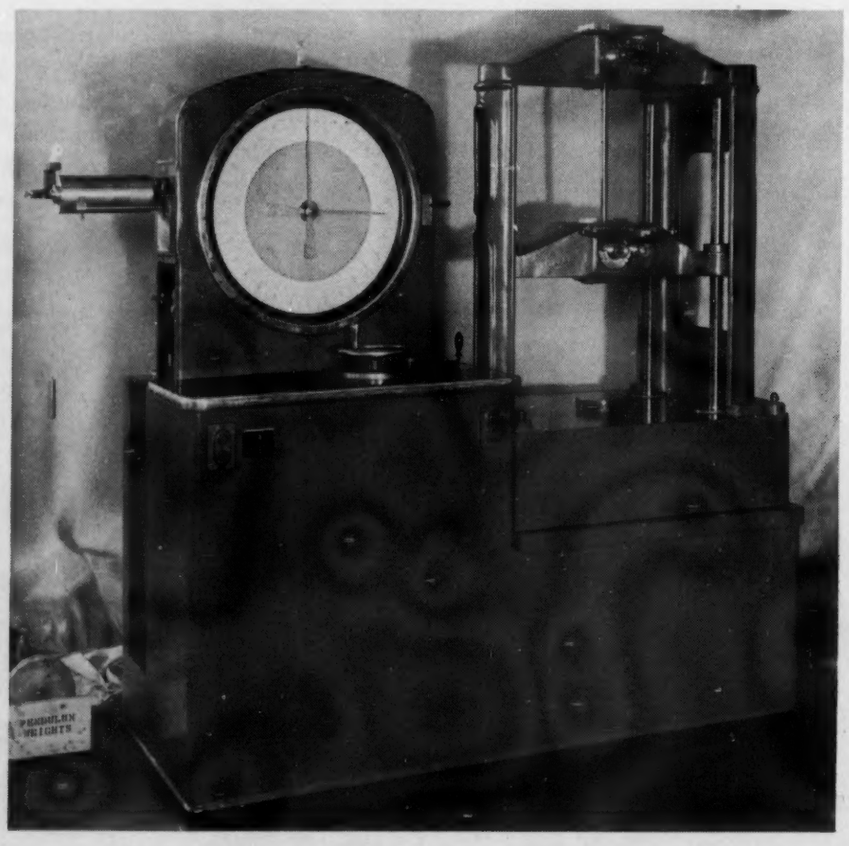
Booth No. B-38—No information available.

Booth No. B-43—George Scherr & Co., New York. No information available.

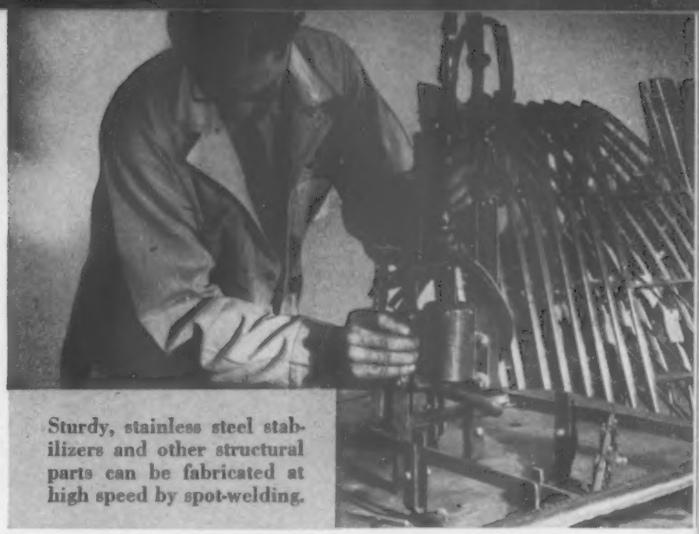
Booth No. A-46—No information available.

Booth No. B-50—National Industrial Publishing Co., Pittsburgh, will exhibit publications.

Left, dead-weight type, fully hydraulic brinell hardness tester, and, right, precision universal screw-power testing machine with 60,000-pound capacity, stepless variable speed drive and pendulum load indicator having five ranges—a new development shown by Reihle Testing Machine Division, American Machine & Metals Inc., East Moline, Ill.



How Stainless Steel *helps to speed up aircraft production*



Sturdy, stainless steel stabilizers and other structural parts can be fabricated at high speed by spot-welding.

THE adaptability of stainless steel to fabrication by spot-welding has made it possible to produce sturdy aircraft structures at unusually high speeds. These stainless steel structures, moreover, have a favorable strength-weight ratio, and give exceptional service because of their high fatigue strength and elastic properties, their resistance to corrosion, and their high strength at both elevated and sub-zero temperatures. In addition, stainless steel can be used in conjunction with other metals. Thus fabricators equipped to work with stainless steel can make stainless steel parts to be later assembled into the plane, which helps to speed up aircraft production at a time when this factor is of vital importance. The illustrations show a few applications which may suggest where you can use stainless steel to advantage.

We do not make steel of any kind, but for over 35 years we have produced "Electromet" ferro-alloys used in making steel. The fund of data on stainless and other alloy steels thus accumulated, and the assistance of our metallurgists are available to you, without obligation. A request on your company letterhead will bring a copy of the book, "Stainless Steel in Aircraft," which describes more fully the advantages of this versatile metal in the aircraft industry.

ELECTRO METALLURGICAL COMPANY

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York, N. Y.

In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

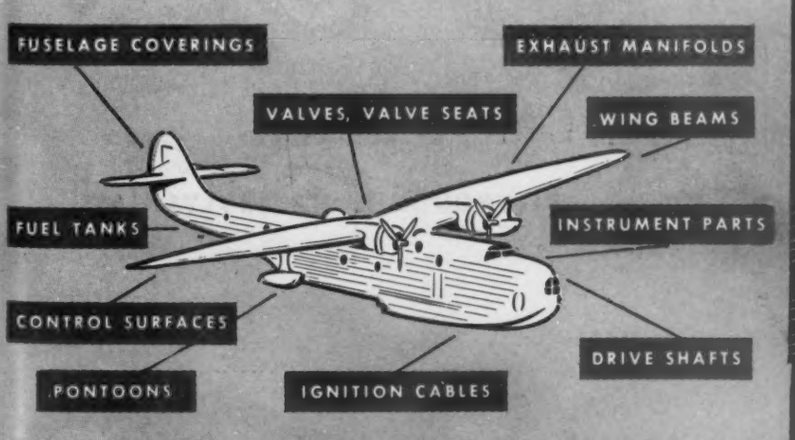
Above: New Fleetwings BT-12 basic trainer, constructed almost entirely of stainless steel, is adaptable to quantity production.

•

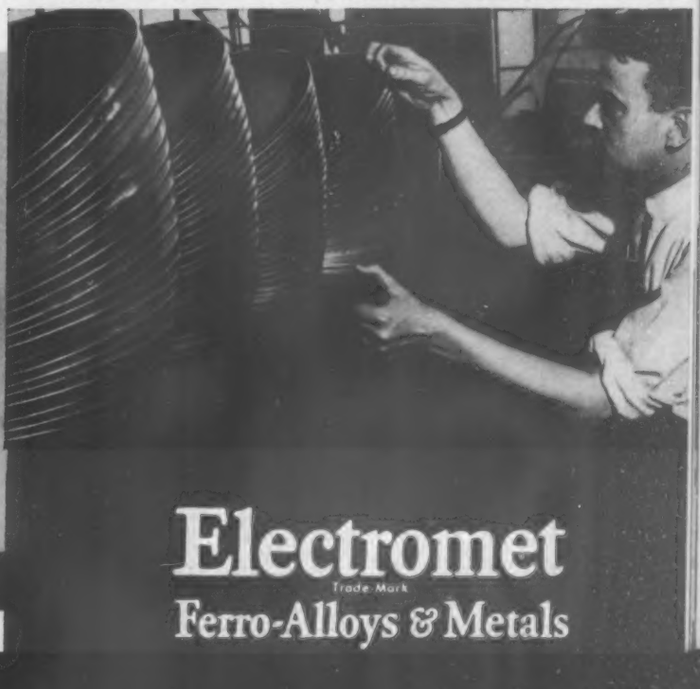
Right: Stainless steel valves are used in aircraft engines because they give long service life and require a minimum of maintenance.

•

Below: These end sections for fuel tanks are typical of the variety of parts being built from thin, strong stainless steel strip.



Some Uses of Stainless Steel in Aircraft



Electromet
Trade Mark
Ferro-Alloys & Metals

Cooperation

• for the future of America

• for the defense of liberty

In the pressing emergency job now being done by the metal industries of America a continuing appreciation of the other fellow's problems—particularly among the production men and metallurgists of both suppliers' and users' plants—will help maintain the highest degree of cooperation in the manufacture of materials for our armed forces.

The National Metal Congress, this year, presents an ideal opportunity to expand the spirit of cooperation — to personally renew, with the other fellow, a partnership of understanding-in-production for the future development of America and the stronger defense of our liberties.

JONES & LAUGHLIN STEEL CORPORATION

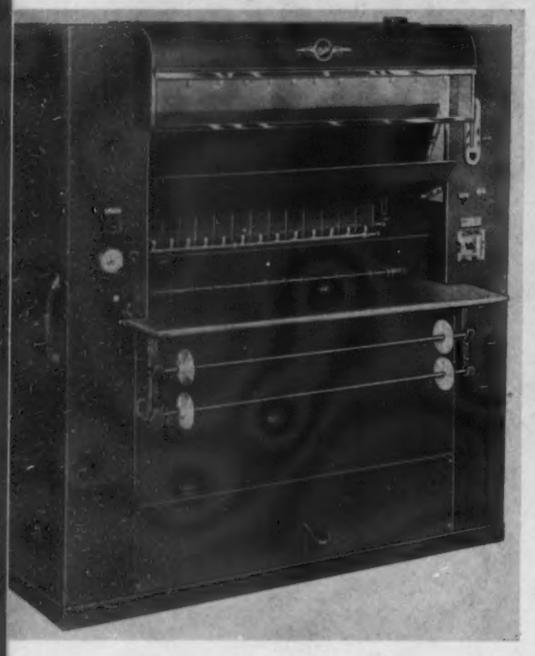
AMERICAN IRON AND STEEL WORKS — PITTSBURGH, PENNSYLVANIA

J & L — PARTNER IN PROGRESS

VISIT THE J&L EXHIBIT *which tells an interesting story of the steel ingot and reveals an important phase of the Controlled Quality method of manufacturing steel products. In attendance will be representatives of the J&L technical staff with whom you will have the opportunity to discuss the use and application of J&L Controlled Quality Steels in your shop.*

J&L STEEL

TO AMERICAN INDUSTRY



High speed Model C automatic whiteprint machine is synchronized to develop and print sensitized materials up to 42 inches in width, in one operation. Requires only one attendant. Shown by Ozalid Products Division, General Analine & Film Corp., Johnson City, N. Y.

Electric portable reciprocating tools handle wide variety of operations including sanding, sawing, honing, filing. They do not replace usual power tools but handle work ordinarily done by hand. Shown by H & H Research Co., 12540 Twelfth street, Detroit

Booth No. B-52—No information available.

Booth No. B-51—A. Schrader's Son, Brooklyn, N. Y. No information available.

Booth No. B-55—Wall-Colmonoy Corp., Detroit. No information available.

Booth No. B-54—Bennett Insured Steel Treating Co., Newark, N. J. No information available.

Booth No. B-56—Metal Industry Publishing Co., New York, will exhibit publications. Representatives: T. A. Trumbour, business manager; W. R. Meyer, editor; P. H. Langdon, assistant editor; J. T. Wiarda, advertising manager.

Booth No. B-58—H. Leach Machinery Co. No information available.

Booth No. B-61—Triplex Machine Tool Co., New York, will exhibit in operation automatic screw machine and spur gear hobbing machine. Representatives: Nicholas Cetrule, proprietor; John Cetrule, general manager; J. H. Schleiffer, sales promotion manager; S. Muscatello, treasurer; E. R. Wilson, A. R. Grillo, R. Dillon, Charles Falcone, F. J. Lanz, salesmen: Alex Kevra, sales engineer; A. H. Halabi, R. Quinn, servicemen; D. I. Wilson, sales engineer; Oscar Schlichter, factory manager; Fred Schlichter, production manager.

Booth No. B-63—National Time & Signal Corp., Detroit, will exhibit in operation clocks and timing devices, signal bells, flasher and lights for aisle or track protection; working models of industrial timers. Representatives: R. S. Fulton, president; M. D. Williamson, chief engineer; P. J. Penman, field engineer; Herbert Bryan of Philadelphia, F. C. Arnold of Washington, P. H. Dorn of New England, district managers. R. S. Fulton Jr., metallurgical engineer.

Booth No. A-61—No information available.

Booth No. A-59—Harold E. Trent Co., Philadelphia. No information available.

Booth No. A-58—Standard Pressed Steel Co., Jenkintown, Pa. No information available.

Booth No. A-57—J. E. Rhoads & Sons, Philadelphia. No information available.

Booth No. A-53—Reeves Pulley Co., Columbus, Ind., will exhibit in operation variable speed transmission, Vari-Speed motor pulley and Vari-Speed Motodrive. Representatives: T. A. Bergen, P. C. Talbot, Chas. Bond Co., Philadelphia representatives; D. W. Clem of New York office; C. M. Reeves; W. R. Perry.

Booth No. A-54—Automotive Industries, Chestnut and Fifty-sixth streets, Philadelphia, will exhibit publications. Representatives: C. A. Musselman, president; J. S. Hildreth, vice president and manager Auto Division; Julian Chase, directing editor, Auto Division; G. C. Buzby, manager, direct mail and sales representative; E. W. Hevner, circulation manager, Auto Division; E. H. Miller, advertising manager, Auto Division; Joseph Geschelin, Detroit technical editor; M. C. Dittmann, sales representative; W. K. Tobolt, editor, *Motor Age;* G. T. Hook, editor, *Commercial Car Journal.*

Booth No. A-50—Eisler Engineering Co. Inc., Newark, N. J., will exhibit spot, butt and arc welders. Representatives: Charles Eisler, president; Charles Eisler Jr., chief engineer; Alex Klein, advertising manager.

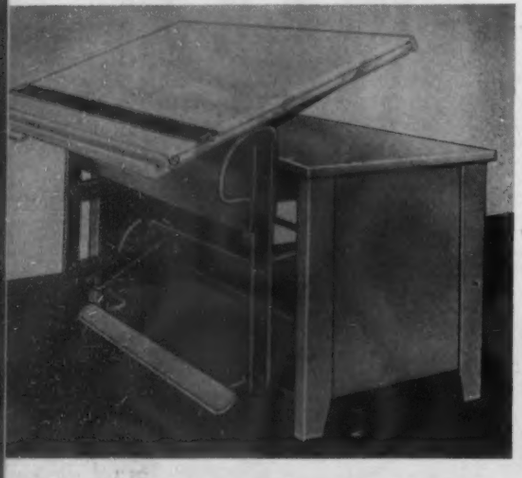
Booth No. A-47—No information available.

Booth No. A-42—No information available.

Booth No. A-38—Reinhold Publishing Co., 330 West Forty-second street, New York, will exhibit publications, *Metals & Alloys.*

Booth No. A-37—Porter-Cable Machine Co., Syracuse, N. Y., will demonstrate wet and dry belt grinding, disc and spindle grinding, electric saws and sanders and grinders; new 4-inch wet-dry belt grinder, model G-4 and model G-8 9-inch wet-dry grinder. Representatives: F. A. Hurd, experimental engineer F. C. Poulsen, field engineer; K. O. Ditmars, J. G. Wells, J. G. Ray, M. H. Rochelle, sales engineers; H. L. Ramsay, sales manager.

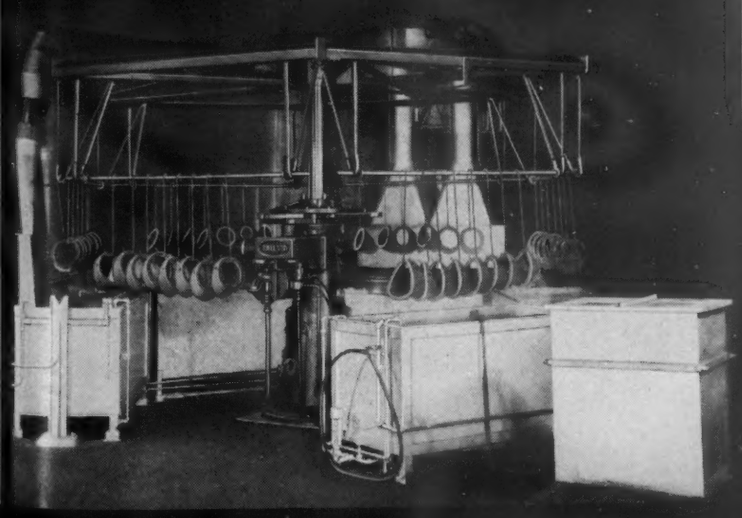
Booth No. A-34—Wire Association, Stamford, Conn., will exhibit publications and tell of services it offers. Representative: E. D. Sickels, in charge of booth.



Drawing surface of the Auto-Lift drawing table can be adjusted instantly to any height or slant throughout a wide range. Board is counterbalanced. Shown by The Hamilton Mfg. Co., Two Rivers, Wisc.

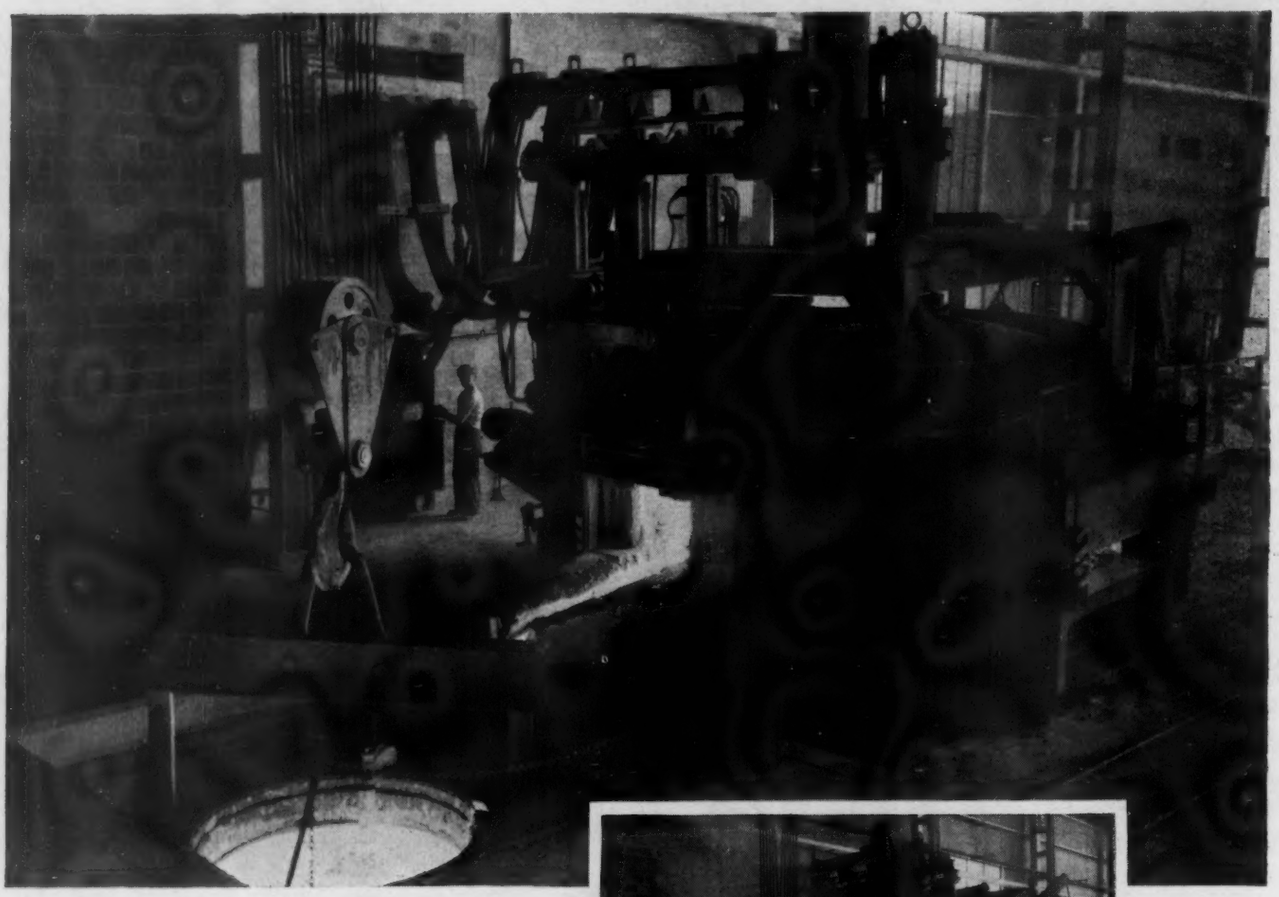
Bothered With Scale?

READ THIS



Bullard-Dunn Process

Why Install a *Heroult* Furnace?



Because it embodies 8 important advantages . . .

HIGH OPERATING EFFICIENCY.
EXTREMELY STURDY DESIGN—low upkeep costs.
SAFETY IN OPERATION—strong and simple tilting mechanism.
SENSITIVITY OF CONTROL—friction losses and inertia reduced to a minimum.
RAPID CHARGING—hand, chute, drop-bottom bucket, or machine charging, depending on size of furnace and operating conditions.
RAPIDITY OF MELT — high-powered and flexible transformer equipment supplied.
LOW OPERATING COSTS—careful attention to details of mechanical and electrical design.
EXCELLENT METALLURGICAL PERFORMANCE — particularly designed for high-quality melting and refining of ferrous materials.

● **(ILLUSTRATED IS A TYPE-20 HEROULT ELECTRIC FURNACE)**
There is a Heroult Electric Furnace design to meet your capacity requirements—ranging from ½ to 100 tons. Significant is the fact that the world's largest electric furnace with rated capacity of 100 tons, built in 1928 and still producing, is an American Bridge Company Heroult Electric.

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General Offices: Frick Building, Pittsburgh, Pa.

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Duluth · Minneapolis · New York · Philadelphia · St. Louis

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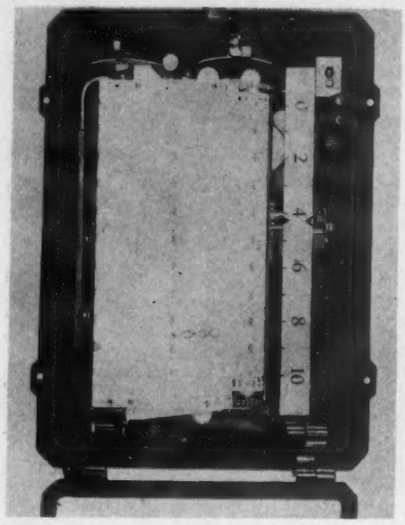
UNITED STATES STEEL



New Celectray proportional controller for throttling fuel heat prevents overshooting and undershooting as the throttling zone can be adjusted over wide limits, according to lag characteristics of the installation. Shown by C. J. Tagliabue Mfg. Co., Park & Nostrand avenues, Brooklyn, N. Y.

Booth No. A-30—Magnaflux Corp., 5908 Northwest highway, Chicago, will demonstrate new and standard inspection units, combination inspection unit and demagnetizer, and demagnetizer. Representatives: A. V. de Forest, president; F. B. Doane, vice president; C. E. Betz, manager Eastern Division; K. E. Glover H. G. Doran; W. E. Thomas; Hamilto" Migel; R. O. Schiebel Jr.

Booth No. A-28—American Allsafe Co., 1245 Niagara street, Buffalo. No information available.

Booth No. A-26—Industrial Publishing Co., Caxton building, Cleveland, will exhibit description and illustrations of advance in use of welding in fabrication, production and repair; publications. Representatives: I. B. Hexter, president; L. P. Aurbach, vice president.

Booth No. A-22—Charles Bruning Co. Inc., 4700 Montrose avenue, Chicago, will exhibit in operation new printing and developing machines and drafting machines.

Booth No. A-23—Hauck Mfg. Co., Brooklyn, N. Y., will exhibit new 1-inch proportioning oil burner in operation and Micro cam oil regulating valve. Representatives: F. J. Schwenk, sales manager; A. J. Turpin, combustion engineer; A. F. Schumann, P. B. Clark, Philadelphia district representatives.

Booth A-19—American Metal Market, 111 John street, New York, will exhibit publications. Representatives: S. P. Trench, vice president; R. A. Langer, secretary; S. Glassford, circulation manager.

Booth No. A-16—Botfield Refractories Co., Swanson and Clymer streets, Philadelphia, will exhibit refractory products. Representatives: A. H. Engstrom, vice president and sales manager; A. J. Wittwer, treasurer; H. H. Hoisington, S. C. Lott, L. L. Tracy, G. B. Botfield, C. C. Phillips, C. C. Highbarger, sales engineers.

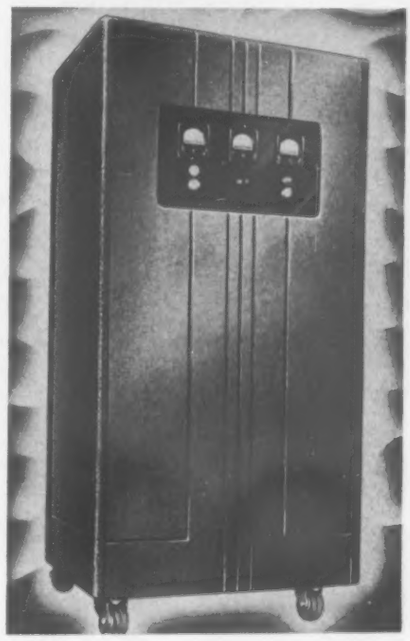
Booth No. A-12—Magnetic Analysis Corp., Long Island City, N. Y., will demonstrate 3¼-inch Dual Method equipment for inspection of steel; standard demagnetizing equipment for steel bars and tubes; special demagnetizing equipment for use at outgoing end of Medart straightener for bars. Representatives: W. S. Gould Jr., vice president; Theodor Zuschlag, chief engineer; J. D. Wilfong Jr., C. T. Germann, field engineers.

Booth No. A-15—Maas & Waldstein Co., Newark, N. J., will exhibit products finished with lacquer, synthetic enamels, substitute finishes, quick drying and baking finishes. Representatives: B. D. Sanderson, sales manager; K. W. Berger, Philadelphia representative.

Booth No. A-11—Eutectic Welding Alloys Inc., 40 Worth street, New York, will exhibit and demonstrate new Castolin Eutectic welding alloys.

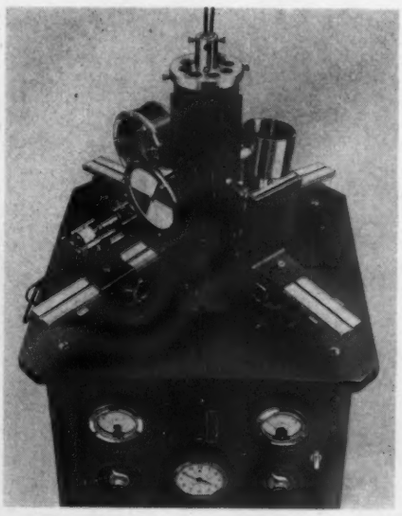
Booth No. A-7—Ohio Seamless Tube Co., Shelby, O., will exhibit seamless and electric welded steel tubing. Representatives: W. C. Connelly, president; A. Waines Jr., manager of sales; R. A. Campbell, assistant manager of sales; M. W. Freese, advertising and sales promotion manager; O. L. Long, Philadelphia district sales manager; P. L. Fair, district sales representative.

Booth A-6—Resistance Welder Manufacturers' Association, Philadelphia, will sponsor lounge and general meeting place. Representatives: M. S. Clark, Federal Machine & Welder Co., Warren, O.; F. E. Taylor, Swift Electric Welder Co., 6560 Epworth boulevard, Detroit; F. H. Johnson, Progressive Welder Co., 3050 East Outer drive, Detroit; E. C. Smith, National Electric Welding Machines Co., Bay City, Mich.; P. M. Hall, Taylor-Hall Welding Corp., Worcester, Mass.; A. D. Jordine, Welding Machines Mfg. Co., 17325 Lamont avenue, Detroit; I. C. Brown, Thomson-Gibb Electric Welding Co., Lynn, Mass.; Charles Eisler, Eisler Engineering Co., Newark, N. J.; H. G. Warnke, Multi-Hydromatic Welding Co., 9640 Grinnell street, Detroit: Carl Raab, Expert Welding Machine Co., W. M. Levyn, Acme Electric Welder Co., 2618 Fruitland road, Los Angeles; Walter Anderson, Taylor-Winfield Corp., Warren, O.; G. A. Sieger, S-M-S Corp., 1161 Harper, Detroit; J. A. Wieger, P. R. Mallory & Co., Indianapolis, Ind.; R. H. Taylor, Electroloy Co. Inc., Bridgeport, Conn.; Walter



Requiring only 33 x 37 inches of floor space, this Thermonic induction heating unit uses a power tube converter to deliver 10 kilowatts or more of power at frequencies up to 500,000 cycles and over, for surface hardening, annealing and other heat-treating work as well as for brazing, forging and melting. Shown by Induction Heating Corp., 389 Lafayette street, New York

Booth No. A-27—American Chain & Cable Co. Inc., Bridgeport, Conn. (Andrew C. Campbell Division, Bridgeport, Pa.; Page Steel & Wire Division, Monessen, Pa.), will exhibit electrodes, gas welding wire, No. 213 abrasive cutting machine, No. 250 nibbler, and the new Cutalator Cutamatic abrasive cutting machine. Representatives (Andrew C. Campbell Division): R. J. Southwell, sales manager; H. G. Robinson, chief engineer; F. Shackelton and Preston Kenyon, service men; (Page Division) W. H. Bleecker, sales manager; R. J. Teeple, district sales manager; J. E. Skinner, Manager, welding wire department; W. G. Hoagland, welding service man; K. G. Hubach, salesman.



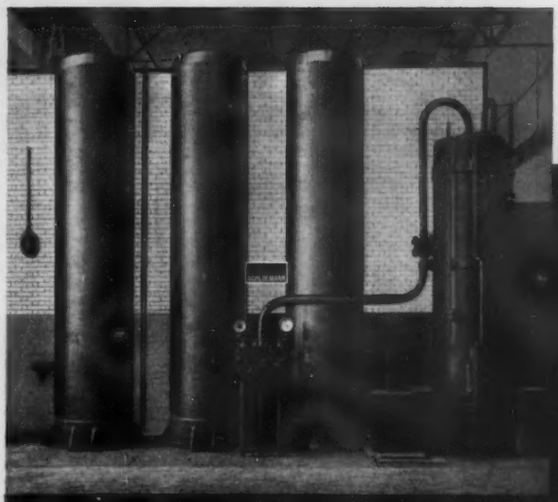
X-ray diffraction unit used for identifying composition and structure of alloys. It has many important applications in control processes for checking effects of rolling, working and heat treatment of metals. Shown by General Electric X-Ray Corp., 2012 Jackson boulevard, Chicago

ON THE SEAS the slightest flaw may be fatal. These reduction gear rings are the vital part of a ship's propulsion drive. Their accurate manufacture is one of the most exacting jobs Midvale handles. Heat-treated, they have uniform properties as required for micrometer machining. They are typical of the type of work produced at Midvale.

THE MIDVALE COMPANY • NICETOWN • PHILADELPHIA, PA.

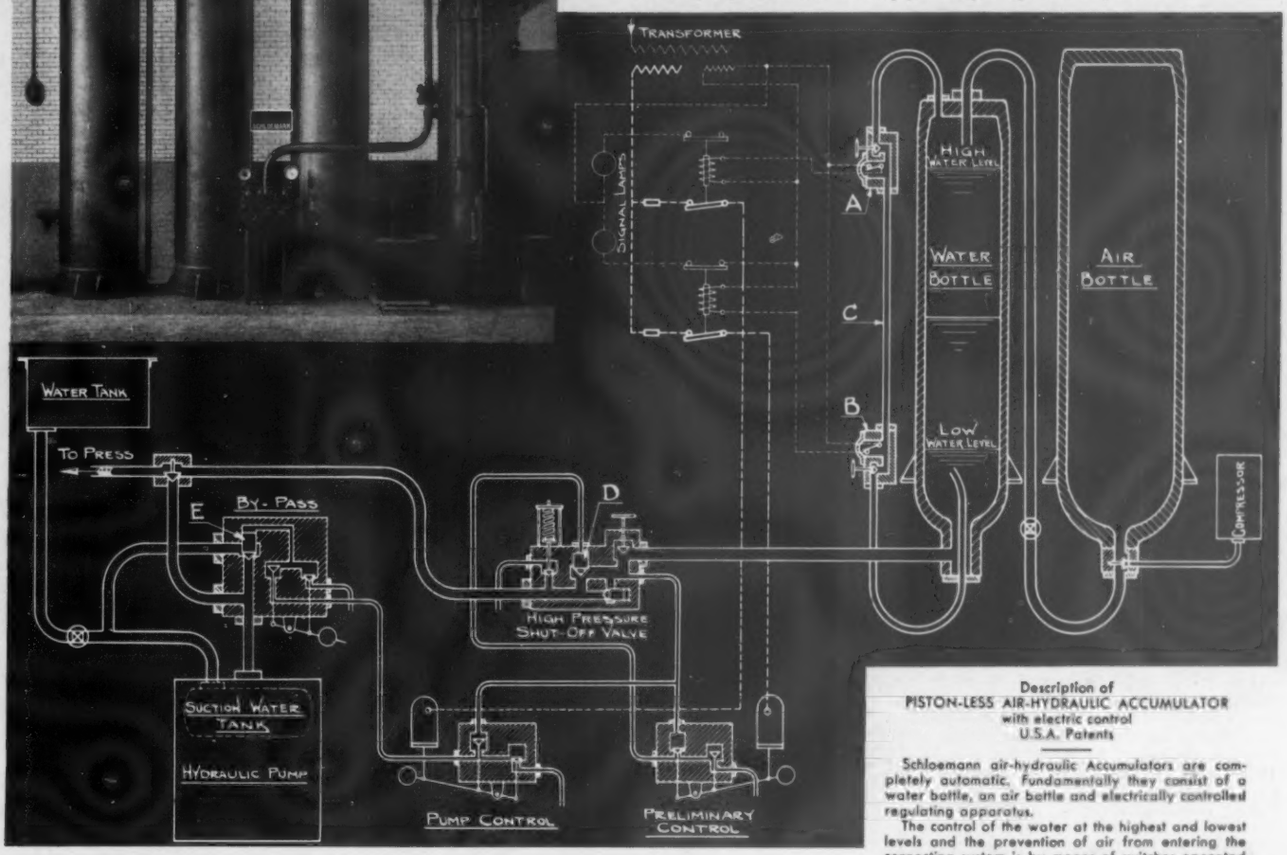
OFFICES: *New York • Chicago • Pittsburgh • Washington • Cleveland • San Francisco*

MIDVALE



Accumulators furnished in sizes from fifty gallons to twenty-five hundred gallons and for pressures up to forty-five hundred pounds per square inch.

System shown at left has two hundred gallons capacity and is designed for twenty-eight hundred and fifty pounds per square inch pressure.



Description of
PISTON-LESS AIR-HYDRAULIC ACCUMULATOR
with electric control
U.S.A. Patents

Schloemann air-hydraulic Accumulators are completely automatic. Fundamentally they consist of a water bottle, an air bottle and electrically controlled regulating apparatus.

The control of the water at the highest and lowest levels and the prevention of air from entering the connecting system is by means of switches operated by floats contained in chambers of a communicating tube "C." Thus the switch "A" in the upper chamber controls the operation of the hydraulic pump, while that in the lower chamber "B" controls the check valve "D" which shuts off the accumulator at lower water level.

The continuous running pump is controlled by closing the By-Pass check valve "E" by means of the pump control, causing it to idle by opening the same and returning the water to the suction end. Over-pressure is released through safety valves and is indicated by an alarm.

SCHLOEMANN

AIR-HYDRAULIC ACCUMULATORS

HYDRAULIC EXTRUSION PRESSES

HIGH PRESSURE PUMPS

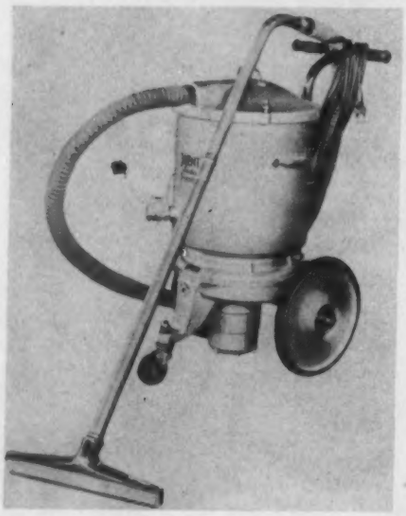
COMPLETE HYDRAULIC SYSTEMS

SCHLOEMANN

ENGINEERING CORP. PITTSBURGH, PA.
Rolling Mill Machinery Hydraulic Presses

Simmons, Welding Sales & Engineering Co.; G. A. Ferniey, secretary and treasurer, Resistance Welder Manufacturers' Association; E. J. Del Vecchio, in charge of booth.

Booth No. A-1—Taylor Winfield Corp., Warren, O. No information available.



Booth No. B-1—Sleeper & Hartley Inc., Worcester, Mass., will demonstrate Nos. 0, 1 and 1½ Universal spring coilers; No. 0 torsion spring machine, Series 607; Larkin air vises. Representatives: W. H. Blount, president and general manager; C. F. Fisher, chief engineer; L. D. Laroche, demonstrator.

Booth No. C-1—D. A. Stuart Oil Co., Ltd., 2727 South Troy street, Chicago, will exhibit extreme pressure machinery lubricants and samples of stainless and other alloy steels machined, deep drawn or ground with them. Representatives: W. H. Oldacre, T. B. Langdon, W. H. Huelster, W. M. Duncan, F. J. Schmitt, H. D. Frueauff Jr., Chicago; C. H. Baker, Cleveland; W. F. Aske, Detroit; C. J. Nagel, Syracuse, N. Y.; A. J. McDuff, Boston; J. J. Rodnite, New York; J. Y. Umbarger, Philadelphia.

Booth No. D-1—Climax Molybdenum Co., 500 Fifth avenue, New York, will have a booth where technical information related to molybdenum can be obtained. Representatives: W. P. Woodside, vice president in charge of research; C. M. Loeb Jr., vice president; A. J. Herzig, chief metallurgist; V. A. Crosby, H. E. Hostetter, George Loeffler, T. E. Norman, R. M. Parke, T. D. Parker, J. F. Robb, P. M. Snyder, E. R. Young, J. E. Wilson, R. L. Wilson, F. L. Woodside, metallurgical engineers; Arthur Linz, chemical engineer.

Leave Museum Hall

Enter Exhibit Hall

Booth No. 207—Una Welding Inc., 1615 Collamer avenue, Cleveland, will exhibit portable automatic heads, portable tractor and alternating-current welding transformer with power factor correction built in. Representatives: W. B. Baker, president; R. P. Tarbell, sales manager; P. J. Cella, assistant sales manager; K. W. Schreeck, chief engineer; Joseph Skuhrovec, electrical engineer.

Booth No. 212—Krouse Testing Machine Co., Columbus, O., will exhibit in operation 10,000-pound direct stress fatigue machine, 5-unit spring fatigue machine, high-speed fatigue machines, plate and sheet fatigue machines, high-temperature fatigue machine. Representatives: G. N. Krouse, president; N. A. Norris, engineer.

Booth No. 208—Claud S. Gordon Co., 1524 South Western avenue, Chicago, will exhibit testing machines and pyrometer accessories. Representatives: C. S. Gordon, president; C. O. Anderson, vice president and manager Cleveland office; V. H. Moore, engineer.

Booth No. 208—Detroit Testing Machine Co., 9390 Grinnell avenue, Detroit, will exhibit testing equipment. Representatives: F. H. Nass; Ralph Campbell.

Booth No. 204—Chapman Valve Mfg Co., Indian Orchard, Mass. No information available.

Booth No. 203—Standard Steel Spring Co., Coraopolis, Pa., will exhibit corronized products including fly screen, golf clubs, outboard motors and milk pails. Representatives: T. N. Berlage, sales manager, Corronizing Division; Richard Rimbach, technical adviser.

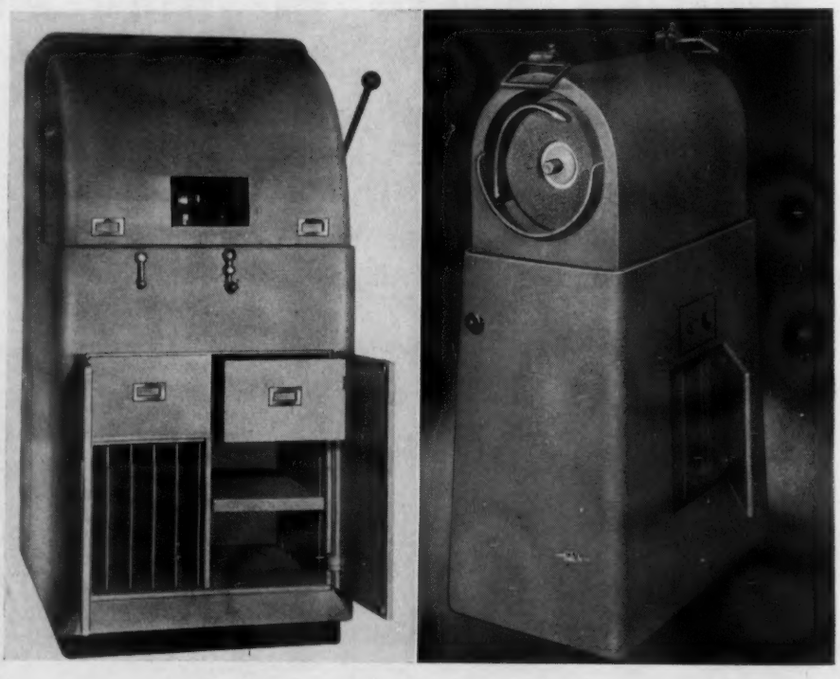
Booth No. 202—P. R. Mallory & Co. Inc., Indianapolis, will exhibit parts made of Mallory nonferrous alloys including welding tips and wheels, dies, holders; electric contacts, circuit breakers. Representatives: J. A. Weiger, vice president, J. D. Tebben, sales manager, R. H. Imes, assistant sales manager, Metallurgical Division; Dr. F. R. Hensel, metallurgical consultant; A. J. Marino, Eastern Division, E. F. Allison, Cleveland-Pittsburgh Division, William Hayes, Detroit Division, sales managers; R. Barry, W. Bullock, G. R. Day, A. R. Gaus, W. G. Fetter, sales department; P. N. Cook, advertising department.

Booth No. 226—Oakite Products Inc., 22 Thames street, New York, will demonstrate materials for production cleaning including new method of preparing aluminum and aluminum alloy surfaces for spot welding. Representatives: H. L. Gray, vice president; J. J. Basch, Philadelphia and Southeastern Division manager; George Seib and E. Lingle, New York office; E. C. Rinker, Metals Section, Research Laboratories; H. P. Jacques, C. S. Anderson, E. B. Scheirey, C. C. Armstrong, service representatives.

Booth No. 250—Horace T. Potts Co., East Erie avenue and D street, Philadelphia, (Beals, McCarthy & Rogers of Buffalo; Brown-Wales Co. of Boston) will exhibit Elastuf steels with illuminated selector. Representatives (Horace T. Potts Co.): Guy P. Bible, sales manager; M. E. Neeley, plant manager; A. L. Collins, assistant sales manager; A. W. Ainsworth, manager tool and alloy steels division; S. L. Bateman, manager general steels division; Arthur Wells, D. C.

The new Kent electric mopper is a recent development for speeding scrubbing operations. It employs a vacuum to remove the water usd in wet scrubbing (also done by a machine). Shown by The Kent Co. Inc., Rome, N. Y.

Completely enclosed design of this new abrasive cut-off machine, left, allows a flood of cooling water on the work at all times. Handles sections up to 3¼ inches in diameter. Right, new wet power grinder has separate self-contained water system for each wheel. Recirculating cooling system with tank, pump, motor and connections is housed in base. Units shown by Adolph I. Buehler, 228 North La Salle street, Chicago



There's no substitute for SKILL in Steel Making

ANDREWS STEEL

INDUSTRY generally has graduated from "rule of thumb." In today's production, guess work and indecision have given way to scientific control . . . methods have rapidly approached standardization, and precision operation is the accepted and essential procedure.

Yet all the modern, intricate safeguards and robot devices have not displaced the craftsmen, whose steelmaking skill still adds the finishing touch—the extra ingredient that puts in iron and steel products greater value and superior performance.

Andrews is proud of its production facilities and the excellence of its products . . . prouder of the men in plant and laboratory whose years have perpetuated the craftsmanship of fine steel making.

To those who seek quality products and a wholly dependable source of supply, Andrews offers many profitable advantages.

THE ANDREWS STEEL CO.
NEWPORT, KENTUCKY

ANDREWS STEEL

DIVISIONS
THE NEWPORT ROLLING MILL COMPANY
THE GLOBE IRON ROOFING & CORRUGATING CO.

ANDREWS PRODUCTS IN BASIC OPEN-HEARTH CARBON AND ALLOY STEEL:
Bars • Plates • Universal Mill Plates • Sheet Bars • Billets • Blooms • Slabs

New midget ¼-inch electric drills—Thor U14 Type—are made in 36 different models, 3 different motor sizes, 5 different speeds, 3 different switch styles and 3 rightangle models to give precisely the correct unit for the particular job at hand. Shown by Independent Pneumatic Tool Co., 600 West Jackson boulevard, Chicago

Enter Arena

Booth, Stage—U. S. Steel Corp. of Delaware, 436 Seventh avenue, Pittsburgh (subsidiaries: American Bridge Co., Frick building, Pittsburgh; American Steel & Wire Co., Rockefeller building, Cleveland, and Cyclone Fence Division, Waukegan, Ill.; Carnegie-Illinois Steel Corp., Carnegie building, Pittsburgh; Columbia Steel Co., Russ building, San Francisco; National Tube Co., P. O. Box 132, Pittsburgh; Scully Steel Products Co., 1319 Wabansia avenue, Chicago; Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.). Based on the theme that research and industrial development actually furnish what many think of as the almost magical results obtainable with modern steels, pleasant and unusual entertainment will be provided in a 50-seat theater. Auxiliary settings will present supplementary puppet shows complete with sound. Photographs and special exhibits will occupy background. Representatives: (American Steel & Wire Co.) W. W. Deal, manager, L. L. Anderson, assistant manager, Philadelphia office; John May, vice president and general manager of sales; H. M. Francis, assistant vice president; John Graham, manager manufacturers products division; R. F. Curtis, assistant manager manufacturers products division; P. B. Gilroy, manager Cleveland sales; W. H. Cordes, manager sales promotion-advertising; T. P. Lowerre, manager of sales, G. H. Mackelcan, manager manufacturers sales, Baltimore office; H. C. Pearson, assistant manager of sales, Boston office; C. T. Gilchrist, manager manufacturers products, Chicago office; H. B. Maguire, manager of sales, Detroit office; F. Connell, assistant general manager of sales, F. O. Howard, manager manufacturers products sales, F. T. Clarke, assistant manager manufacturers products, New York office; F. J. Marmion, manager of sales, Pittsburgh office, and others.

(Carnegie-Illinois Steel Corp.): P. H. Van Pelt, bureau manager, sheet division; L. B. Worthington, manager of sales, bar strip and semi-finished; George Higgins, assistant manager of sales, bar strip and semi-finished; B. S. Chapple Jr., manager of sales promotion; R. J. Ritchey, assistant to manager of sales promotion; P. V. Voigt Jr., manager stainless division; J. F. Gordon, assistant manager stainless division; L. C. Bibbee and J. Heuschkel, welding engineers; F. T. Bumbaugh, metallurgical engineer, bar and semi-finished; John Mitchell, metallurgical engineer, alloy bureau, Pittsburgh; B. E. Eudy, stainless representative of Cleveland; D. C. Buck, stainless representative of New York; J. D. Darby, manager of sales, W. C. Bobbitt, assistant to manager of sales, S. E. Daut and S. C. Lore, sales engineers, Philadelphia; and others. (Cyclone Fence Division): L. S. English; J. C. Anderson. (National Tube Co.): J. E. Fleming; D. T. Marvel; Fred Raab; T. E. Conklin; D. E. Hutchinson. (Scully Steel Products Co.): W. P. Maguire, Philadelphia office. (U. S. Steel Corp. of Delaware): A. C. Adams, vice president of sales; C. R. Moffatt, director of advertising; M. L. Neison, manager of exhibits; A. C. Wilby, assistant to vice president and E. C. Logelin, assistant to Mr. Wilby, Chicago.

Taylor, C. F. Coleman, C. M. Rusk, W. H. Dunlap, W. B. Jackson, L. D. Willis, H. T. Potts, H. O. Whitaker, J. H. Kern, salesmen; (Beals, McCarthy & Rogers Inc.): J. F. Rogers, president; G. R. Hine, engineer; (Brown-Wales Co.): Q. W. Wales, president; V. A. Dodds, vice president; A. F. Rugg, special steels division.

Leave Exhibit Hall

New Tocco two-station induction heating machine, rated 20 kilowatt and well adapted for brazing, heating for forging, stress relieving, soldering as well as surface hardening. Handles a wide variety of parts at high production speeds. Shown by Ohio Crankshaft Co., 6600 Clement avenue, Cleveland

Booth No. 30—Adolph I. Buehler, 228 North La Salle street, Chicago, will exhibit in operation cutters, grinders, polishers, microscopes, metallographs and other metallurgical instruments. New products include abrasive cut-off machine and wet power grinder. Representatives: A. I. Buehler, owner; G. W. Graves, metallurgist; E. J. Weidner, salesman.

Booth No. 27—Babcock & Wilcox Co., 85 Liberty street, New York, will exhibit models and panels showing refractory constructions as well as firebrick, concrete mixes, mortars and plastics. Representatives, (Refractories Division): A. M. Kohler, general manager; J. E. Brinckerhoff, sales manager; J. D. McCullough, engineering design; C. L. Norton, research engineering department; G. M. Frederick, Philadelphia district sales manager; M. A. Kohler, Philadelphia sales office; J. W. Moffat; (Advertising Division): C. M. Neighbors, manager.

Booth No. 23—Machinery, New York, will exhibit publications.

Booth No. 28—Tempil Corp., New York, will demonstrate method for determining temperatures in actual shop

(Please turn to Page 260)

HELP YOURSELF

BY HELPING US SPEED UP FURNACE DELIVERY

Above: Part of the engineering personnel for the design of tailor-made furnaces at Surface Combustion.

AT THE METAL SHOW

Stop in and see us at our booth in the Gas Section at the Metal Show. We will welcome the opportunity of discussing your heat treating problems with you.

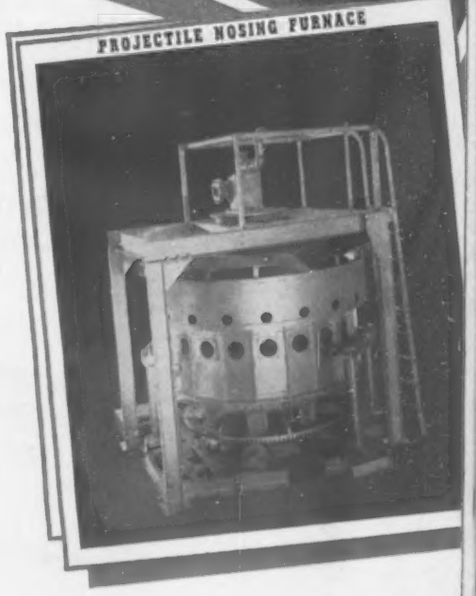
Are you considering the purchase of a heat treating furnace for defense production and on which delivery time is a factor? If so, you can materially speed up delivery by utilizing a furnace already designed and of which duplicates are in operation.

On the average "tailor-made" furnace as much as one-third of the delivery time is consumed in the design and drafting departments. Literally hundreds of new drawings are required and where castings are involved new patterns have to be made. This all takes time . . . time which is not required if the design is available.

Surface Combustion has available a wide selection of established designs and sizes to choose from . . . for armor plate, aeroplane parts, projectiles, cartridge cases, bombs, gun tubes and mounts—the numerous component parts used in tractors, tanks, trucks, etc., in fact for every metallic item used in defense and defense production machines. Many of these furnaces have been developed in cooperation with the Arsenals and Navy Yards. All have been time-tested under actual production and are free of the last operating "bug".

However, should by chance, one of these established designs not be suitable for your production, then we are prepared to bend every effort in designing and delivering a new furnace for you in the shortest possible time without sacrificing the high qualities which have always been associated with Surface Combustion furnaces.

SURFACE COMBUSTION CORPORATION • TOLEDO, OHIO



"SECURITY FOR AMERICA"

SURFACE COMBUSTION

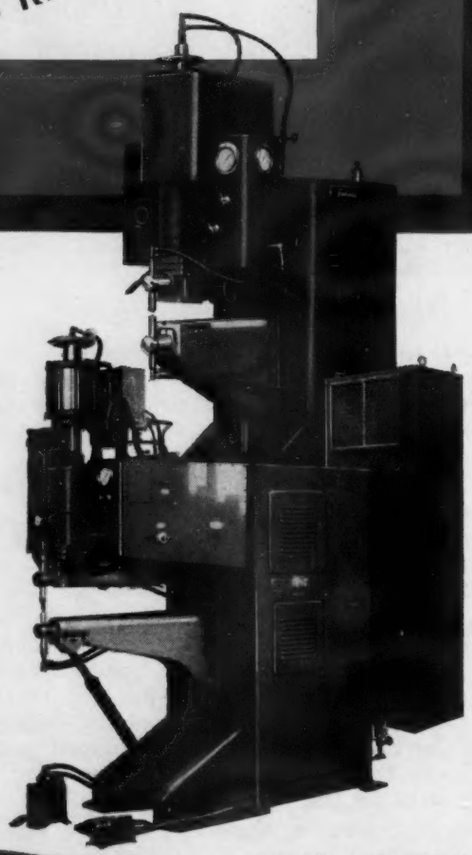
MANUFACTURERS OF INDUSTRIAL FURNACES . IDEAL-NU GAS-FIRED SPACE HEATING EQUIPMENT . AND KATHABAR AIR CONDITIONING SYSTEMS

ALWAYS CONSIDER RESISTANCE WELDING

DEFENSE INDUSTRIES

GEARED TO MEET DOUBLE DEMAND

COMMERCIAL RESEARCH



INCREASED engineering and production facilities enable Federal to handle National Defense orders and maintain commercial research. Federal production is geared to meet service demands . . . whether it's a newly developed Uni-Pulse Roller Spot Welder used by the aircraft industry, or rugged, modernly designed, conventional machines for commercial applications. If you have a metal fabricating problem, consider resistance welding. There is a standard or special Federal machine to do the job.

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THE Federal MACHINE AND WELDER COMPANY WARREN, OHIO

SALES OFFICES IN ALL PRINCIPAL CITIES

NATIONAL DEFENSE GROUP MEETINGS

. . . . on defense problems, conservation and substitution, sponsored by American Society for Metals and held in conjunction with 1941 National Metal Congress and Exposition at the Benjamin Franklin Hotel and Convention Hall, Philadelphia, Oct. 20 to 24, inclusive

Monday, Oct. 20

11:30 A.M.—Ballroom Benjamin Franklin Hotel

Defense Meeting

2:30 P.M.—Ballrom Convention Hall

A.S.M. National Defense Group Meeting on Low Carbon Alloy Steels (Case Hardening Steels)

Leader: G. T. Williams, metallurgist, Deere & Co.

Summarizer: O. W. McMullan, metallurgist, Youngstown Sheet & Tube Co., Youngstown, O.

Report from Conservation and Substitution Committee of OPM.

"Commonly Used Alloy Steels That Are Scarce or Unobtainable", by Walter Hildorf, chief metallurgical engineer, Timken Steel & Tube Co., Canton, O.

"Suggestions About Substitutes That Will Not Run Into Other Bottlenecks", by E. T. Barron, manager, Metallurgical Division, Pittsburgh District, Carnegie-Illinois Steel Corp., Pittsburgh.

"Comparison of Scarce Steels and Substitutes as to Machinability, Speed of Carburization, Hardness of Case, Uniform Hardenability of Case, Strength and Toughness of Core, Nature of Quench, Amount of Distortion During Heat Treating", by F. E. McCleary, metallurgical engineer, Chrysler Corp., Detroit.

"Possibilities of Flame Hardening, Induction Hardening, and Salt Bath Hardening of Substitute Steels", (Speaker to be announced).

"Changes in Mechanical Design of a Part To Permit Substitutes", (Speaker to be announced).

8:00 P.M.— No. 300 Room, Conventional Hall

Manufacture of Shell

Leader: A. F. Macconochie, head, Department of Mechanical Engineering, University of Virginia, Charlottesville, Va.; contributing editor, Steel.

Summarizer: (To be announced)

"Shell Steel", (Speaker to be announced).

"Forged Shell", by F. G. Schranz, general manager, Baldwin-Southwark Division, Baldwin Locomotive Works, Eddystone, Pa.

"Heat Treatment of Shell", by Col. H. H. Zornig, Office of Chief of Ordnance, Washington.

"Sand Blasting of Shell", (Speaker to be announced).

"Machining of Shell", by B. C. Brosheer, associate editor, *American Machinist*, 330 West Forty-second street, New York.

"Cartridge Cases", by Alan Morris, research engineer, Bridgeport Brass Co., Bridgeport, Conn.

8:00 P.M.—Ballroom, Convention Hall

Problems in the Fabrication of Aluminum Base Alloys and Magnesium Base Alloys for Defense Material

Leader: E. H. Dix Jr., chief metallurgist, Aluminum Co. of America, Pittsburgh.

Summarizer: Harry Huester, metallurgist, Reynolds Metals Co.

"Aluminum Castings and Their Heat Treatment", by B. Clements, metallurgist, Wright Aeronautical Corp.

"Aluminum Forgings and Their Heat Treatment", by L. W. Davis, chief metallurgist, Forgings Division, Aluminum Co. of America, New Kensington, Pa.

"Aluminum Structural Shapes and Sheet, and Their Heat Treatment", by T. W. Bossert, assistant chief metallurgist, Fabricating Division, Aluminum Co. of America.

"Welding of Aluminum", by G. O. Hoglund, welding engineer, Aluminum Co. of America.

"Machining of Aluminum", by W. A. Dean, research metallurgist, Aluminum Co. of America.

"Magnesium Castings", by A. W. Winston, director, metallurgical department, Dow Chemical Co., Midland, Mich.

Tuesday, Oct. 21

11:30 A.M. — Ballroom, Benjamin Franklin Hotel

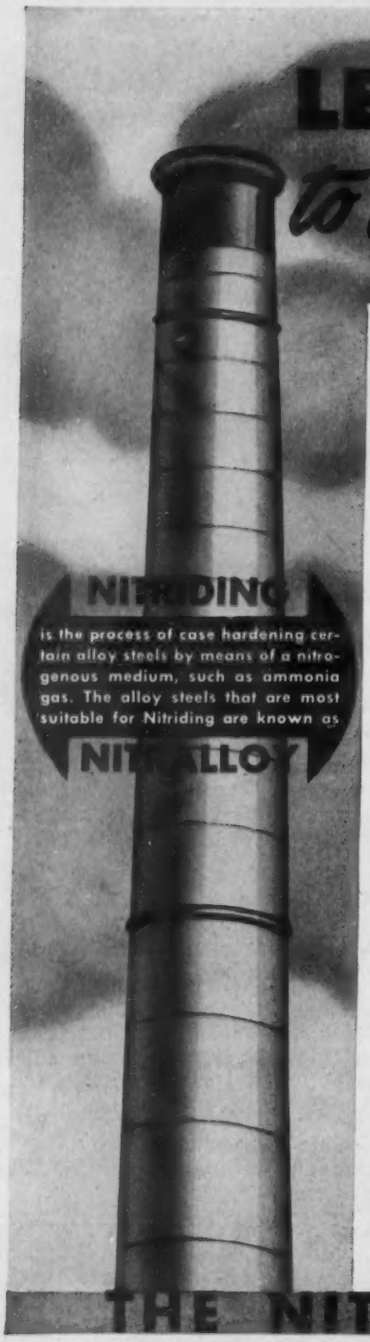
Defense Meeting

2:30 P.M.—Ballroom, Convention Hall

Higher Alloy Steels (Oil Quenching Steels)

Leader: M. A. Grossmann, Chief Metallurgist, Chicago District, Carnegie-Illinois Steel Corp.

Summarizer: Harry W. McQuaid, consultant, OPM, and assistant


NITRIDING
is the process of case hardening certain alloy steels by means of a nitrogenous medium, such as ammonia gas. The alloy steels that are most suitable for Nitriding are known as
NITRALLOY

LET'S WAR ON WASTE

to Conserve our Resources

TO conserve needed metals, let's reduce the waste of wear as well as the waste of war. Nitralloy, the alloy-steel that produces the hardest steel surface known, conserves steel, alloys, labor, shop capacity, transportation, fuel and power by prolonging the life of vital machinery parts subject to wear, fatigue and abrasion.

In defense work, Nitralloy and the Nitriding Process contribute to the effectiveness and stamina of planes, tanks, trucks, artillery, and marine equipment—as well as of the machine tools needed to produce these sinews of war.

Throughout industry, Nitralloy and the Nitriding Process have lengthened the useful life of machine parts in wide variety, including

BUSHINGS	GAGES	PISTONS	SHAFTS
CAMS	GEARS	PLUNGERS	VALVES
CONNECTING RODS	GUIDES	PUMP PARTS	WEAR PLATES
CYLINDER BARRELS	MANDRELS	ROLLS	WIRE GUIDES

Four commonly used Nitralloy compositions employ

CARBON	0.2 TO 0.45
MANGANESE	0.4 TO 0.70
SILICON	0.3 MAXIMUM
CHROMIUM	0.9 TO 1.80
ALUMINUM	0.75 TO 1.50
MOLYBDENUM	0.15 TO 0.60

Nitrided Nitralloy parts can be produced with case hardness exceeding 1000 Vickers-Brinell, and core hardness of more than 300 Brinell, with ultimate strengths up to 190,000 lbs. per sq. in. Within wide limits, strength and hardness of core are variable at will by correct selection of composition and heat-treating temperature.

Nitralloy metallurgists welcome consultation and opportunities to recommend the most suitable composition and treatment for any given purpose. The Nitralloy Data Book will be useful in considering possible applications. Copies are available on request to us or our licensees.

THE NITRALLOY CORPORATION

230 PARK AVENUE **NEW YORK, N.Y.**

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CRUCIBLE STEEL CO. OF AMERICA.....NEW YORK, N. Y.
FIRTH-STERLING STEEL CO.....McKEESPORT, PA.
REPUBLIC STEEL CORPORATION.....CLEVELAND, O.
THE TIMKEN ROLLER BEARING CO.....CANTON, O.
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MET-LAB, INC.....PHILADELPHIA, PA.
NEW ENGLAND METALLURGICAL CORP.....BOSTON, MASS.
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Manufacturers of Nitralloy Steel Castings

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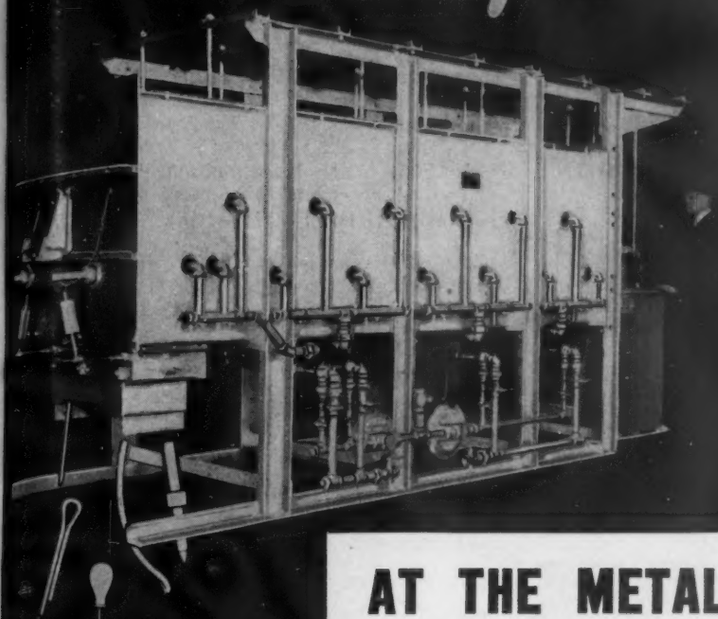
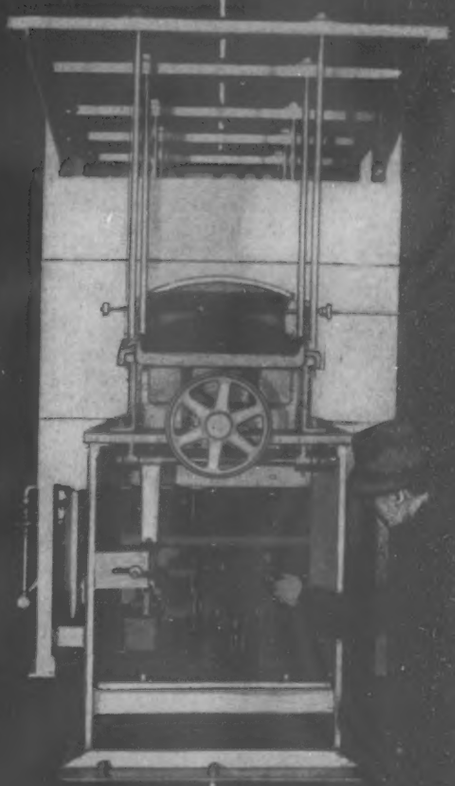
WARMAN STEEL CASTING CO.....LOS ANGELES, CAL.

Work only enters and leaves--



the heating chamber of this latest and largest reciprocating hearth Heating Machine.



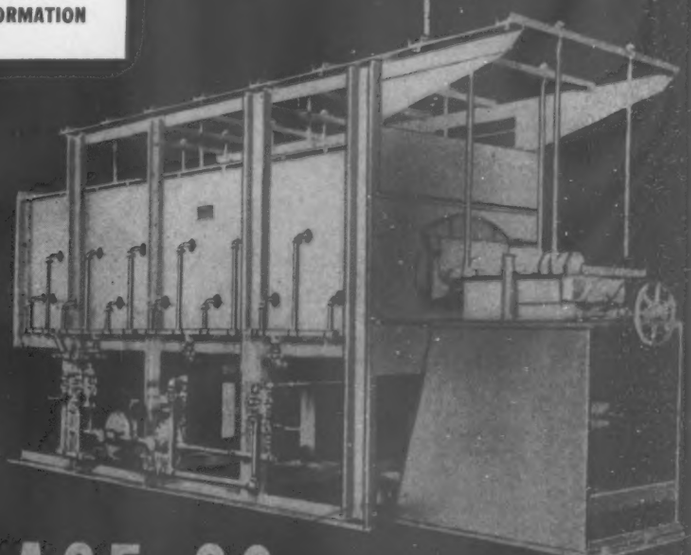
AT THE METAL SHOW

See this Versatile Clean Hardening Machine. It is suitable for anything from small springs, including GARAND CLIPS, up to large heavy pieces such as 37 MM. CORES. Even large steel balls are successfully treated in these reciprocating full muffle machines.

Therefore, you should give them careful consideration because they are so well adapted to present "Production for Defense" and because they can subsequently be used so advantageously in "Peacetime Manufacturing" where production costs will be an important factor.

Supplied in four sizes ranging from 10 to 600 lbs. per hour and a fifth size, capacity 1200 lbs. per hour, is now being built.

SEE US AT THE METAL SHOW IN PHILADELPHIA OR DROP US A LINE REQUESTING COMPLETE INFORMATION



AMERICAN GAS FURNACE CO.

ELIZABETH, N. J.

chief metallurgist, Republic Steel Corp.

Report from Conservation and Substitution Committee of OPM.

"Outline of Function of Principal Alloys in Steel", by E. C. Bain, assistant to the vice president, U. S. Steel Corp.

"Commonly Used Alloy Steels That Are Scarce or Unobtainable", (Speaker to be announced).

"Standardization of Steel Specifications", by C. L. Warwick, consultant, Government Conservation Board, Division of Purchases, OPM.

"Suggestions About Substitutes That Will Not Run Into Other Bottlenecks: (a) Means of Making Fine-Grained Steels", by M. J. R. Morris, chief metallurgical engineer, Republic Steel Corp.

"Evaluating the Hardenability of Steel", by W. E. Jominy, research metallurgist, Chrysler Corp.

"Comparison of Scarce Steels and Substitutes as to Availability and Cost, Machinability at Normal and High Hardness Levels, Physical Properties Obtainable, Heat Treating Schedule and Quenching Equipment, and Distortion", by H. J. French, manager, alloy steel and iron development, International Nickel Co. Inc., New York.

"Changes in Mechanical Design of a Part To Permit Substitution", (Speaker to be announced).

8:00 P.M.—No. 300 Room, Convention Hall

Copper and Its Alloys

Leader: H. P. Croft, assistant director of research, Cleveland Mills Division, Chase Brass & Copper Co., Cleveland.

Summarizer: Major L. S. Fletcher, Frankford Arsenal, Philadelphia.

"Increasing Production by Elimination of Unnecessary Alloys", by D. K. Crampton, director of research, Chase Brass & Copper Co.

"Standardization of Specifications", by C. L. Warwick, consultant, Government Conservation Board, Division of Purchases, OPM.

"Conservation of Copper by Use of Temporary Substitutes: (a) In Diversified Industry", by W. B. Price, chief chemist and metallurgist, Scovill Mfg. Co.,; (b) "In the Electrical Industry", by T. S. Fuller, engineer of materials, Schenectady Works Laboratory, General Electric Co.; (c) "In Communications Industry", by E. E. Schumacher, Bell Telephone Laboratories, New York.

"Use of Copper Alloys as Alternates for Scarce Metals", by J. R. Freeman, manager, technical department, American Brass Co.

"Copper and Its Alloys in Munitions Parts", by Lt. W. W. Culbertson, Frankford Arsenal.

"Copper in Iron and Steel for Defense Work", by J. E. Jackson, metallurgical engineer, Copper Iron and Steel Development Association.

Arthur F. Macconochie

Head, Department of Mechanical Engineering, University of Virginia; Contributing Editor, STEEL

8:00 P.M.—Ballroom, Convention Hall

Stainless and Heat Resisting Steel

Co-Chairman (Steel): A. L. Feild, director of research, Rustless Iron & Steel Corp.

Co-Chairman and Summarizer (Corrosion): R. J. McKay, chemical engineer, International Nickel Co. Inc.

Report from Conservation and Substitution Committee.

The Problem of Conservation:

"Substitutes for Decorative Uses", by C. E. Heussner, Chrysler Corp.

"Use of Alloys of Lower Chromium and/or Nickel; "16% Cr. 1½% Ni", by S. P. Watkins, manager, Development Division, Rustless Iron & Steel Corp.; "13% Cr Steels", by R. A. Lincoln, assistant director of research, Allegheny Ludlum Steel Corp., Pittsburgh.

"Use of Reclaimed Scrap in Higher Carbon Analyses", by H. A. Grove, metallurgist, Alloy Steel Division, Republic Steel Corp., Cleveland.

"Clad Materials", by S. L. Hoyt, technical advisor, Battelle Memorial Institute, Columbus, O.

"Conservation of and Substitution for Heat Resisting Alloys", by M. A. Hunter, technical staff, Driver-Harris Co.

The Problem of Substitution:

"Uses of Copper-Silicon and Other Copper Alloys", by J. R. Freeman, manager, technical department, American Brass Co.

"Lead", by R. L. Hallett, chief chemist, National Lead Co.

"Silicon Irons", by D. E. Jack, general sales manager, Duriron Co. Inc.

"Calorized Irons", by B. J. Sayles, Calorizing Co.

"Silicon Cementation", by H. K. Ihrig, director of laboratories, Globe Steel Tubes Co., Milwaukee.

"Manganese, Copper, Aluminum and Silicon as Substitutes for Chromium and Nickel in Quasi-Stainless Steels", by Russell Franks, metallurgical engineer, Union Carbide & Carbon Research Laboratories Inc., New York.

"Silver and Platinum Lined Equipment", by F. E. Carter, director of research, Baker & Co.

Wednesday, Oct. 22

2:30 P.M.—Ballroom, Convention Hall

High-Strength Low-Alloy Steels (Weldable Grades for Pressure Vessels, Piping, Ships, Rolling Stock)

Leader: Col. G. F. Jenks, Ordnance Department, U. S. Army, Washington.

Summarizer: J. C. Hodge, vice president, Wellman Engineering Co.

(This discussion to confine itself to steels used as received from steel mills; the customer doing no heat treatment other than perhaps a stress relief.)

Report from Conservation and Substitution Committee.

YODER

HOLDS AN IMPORTANT POSITION
in the VICTORY *drive*

as calls ring out for more and more machinery to produce armaments and other implements of war for the nations defending democracy and our own army and navy.

Yoder operations deal with the actual production of steel through successive operations of machining, fabricating, forming, welding and cutting; and to many other vital designing and building contracts that must as yet be held in strict confidence.

For over 30 years The Yoder Co. has specialized in the designing and building of metal forming equipment and steel mill machinery as well as an extensive line of interrelated machines.

TODAY, 'round the clock, Yoder plants are "beehives" of activity — important sources of machines to aid in successfully consummating the Victory Drive.

Roll Forming Machinery

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YODER ALSO MAKES:

Brake Shoe Machines
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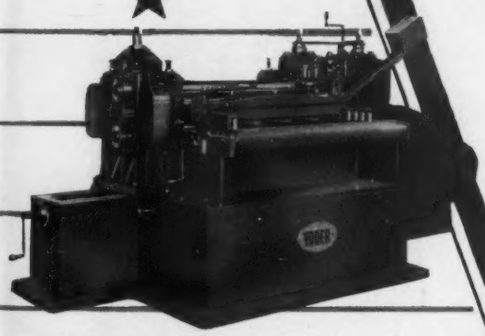
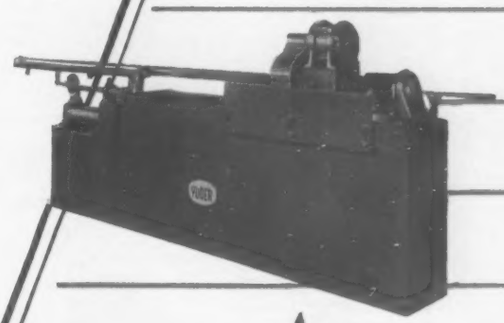


Sheet Gang Slitters and Side Trimmers



Cut-off Equipment

Complete Tube Mills

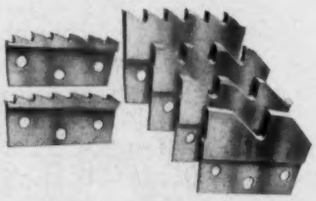
THE YODER COMPANY
5500 WALWORTH AVENUE
CLEVELAND, OHIO

Huther circular metal cutting saws, inserted segment type and solid type, Huther metal cutting band saws described in this catalog. Also tungsten carbide tipped saws for cutting copper and aluminum. Catalog No. 60 sent on request.

HUTHER BROS. SAW MFG. CO.

Inserts For Fine Pitch Saw

Patented October 25, 1902; January 19, 1915



The view above shows four of the different sizes of teeth used in the fine pitch type of Huther Bros. Patent Milling Saws.

The two inserts at the left were taken from a saw that had been in continuous use for some time without having broken insert.

The wear is equal to about two inches on the diameter and the special heat treatment given these inserts—which are the best quality high speed steel—insures longer runs between sharpenings.

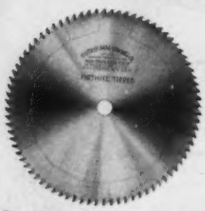
This is a saw that means real economy for the user. May be sharpened on automatic saw sharpener.

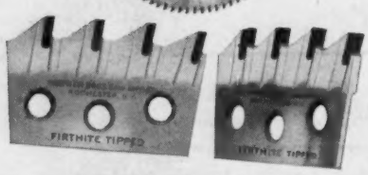
74

HUTHER BROS. SAW MFG. CO.

Firthite Tipped Saw

Inserted Type, for Metal





FIRTHITE-TUNGSTEN CARBIDE, is used for tipping this Saw. Saw is made especially for cutting non-ferrous metals, fibres, plastics, etc. Write for full information.

75

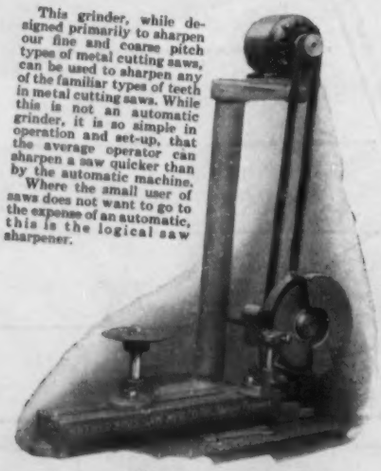
HUTHER BROS. SAW MFG. CO.

Huther Bros. No. 2 Saw Sharpener

Universal Saw Tooth Grinder

This grinder, while designed primarily to sharpen our fine and coarse pitch types of metal cutting saws, can be used to sharpen any of the familiar types of teeth in metal cutting saws. While this is not an automatic grinder, it is so simple in operation and set-up, that the average operator can sharpen a saw quicker than by the automatic machine.

Where the small user of saws does not want to go to the expense of an automatic, this is the logical saw sharpener.

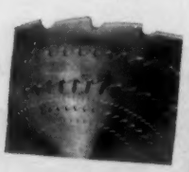


78

HUTHER BROS. SAW MFG. CO.

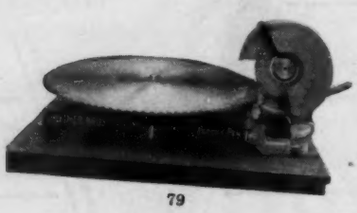
Huther Bros. No. 2 Saw Sharpener

PATENTED • Made by HUTHER BROS.



This saw sharpener can be used for sharpening both coarse and fine pitch metal cutting saws, inserted tooth type, also for sharpening solid milling saws. Sharpens both alternate bevel teeth and straight teeth. Any space teeth from ¼-inch up can be used with or without index.

•Furnished With or Without Motor Drive



79

Huther Bros.
Saw Mfg. Co., Inc.
1290 University Ave.
Rochester, N.Y., U.S.A.

Saw Makers for over 60 Years

"Alloys Available to Give Strength Without Heat Treatment", by A. B. Kinzel, chief metallurgist, Union Carbide & Carbon Research Laboratories Inc.

"Limits of Alloying Before Weldability Is Impaired", by L. C. Bibber, welding engineer, Carnegie-Illinois Steel Corp.

"Substitutes for Scarce Alloys", by B. D. Saklatwalla, consultant, Alloys Development Corp.

"Welded Pipe and Pressure Vessel Linings", by M. A. Scheil, research metallurgist, A. O. Smith Corp.

Substitutions in Various Industries:

"Railroad Rolling Stock", by B. D. Saklatwalla, consultant, Alloys Development Corp.

"Pressure Vessels, Piping and Bolting", by J. J. Kanter, materials research engineer, Crane Co., Chicago.

"Large Forgings", by F. B. Foley, superintendent, research department, Midvale Co.

"Ships' Hulls", by P. D. Ffield, materials engineer, Bethlehem Steel Co., Shipbuilding Division, New York.

"Bridges and Building Skeletons", by Jonathan Jones, chief engineer, Bethlehem Steel Co.

Inspection of Metals

8:00 P.M.—Ballroom, Convention Hall

Leader: J. W. W. Sullivan, head, inspection division, Cleveland Ordnance District.

Summarizer: W. J. Jeffries, district chief engineer, Philadelphia Ordnance District.

"Principles of Inspection of Nonferrous Materials", by E. E. Thum, editor, *Metal Progress*, 7301 Euclid avenue, Cleveland.

"Principles of Inspection of Ferrous Materials", by Earl Blaine, chief inspector, E. G. Budd Mfg. Co.

"Principles of Aircraft Inspection", by C. G. Stephens, materials supervisor, Glenn L. Martin Co., Baltimore.

"Inspection of Aircraft Engine Materials", by E. S. Marks, quality engineer, Pratt & Whitney Aircraft Division.

"Army Ordnance Inspection", by Brig. Gen. R. H. Somers, Ordnance Department, U. S. Army, Washington.

"Navy Ordnance Inspection", (Speaker to be announced).

"Marine Construction Inspection", by Capt. R. T. Hanson, U.S.N., supervisor of shipbuilding, Cramp Shipbuilding Co.

"Training of Inspectors", by Capt. K. J. Soderberg, Civilian Personnel Division, Office of Chief of Ordnance, U. S. A., Washington.

Thursday, Oct. 23

11:30 A.M. — Ballroom, Benjamin Franklin Hotel

Defense Meeting

2:30 P.M.—Ballroom, Convention Hall

Alloy Castings (Steel and Iron)

Co-Chairman (Iron Castings): A. L. Boegehold, head, metallurgical department, Research Laboratories Division, General Motors Corp.

Francis B. Foley

Superintendent, Research Department, Midvale Co., Nicetown, Philadelphia

Co-Chairman and Summarizer (Steel Castings): C. H. Lorig, Battelle Memorial Institute.

Report from Conservation and Substitution Committee.

"Function of Nickel, Chromium and Vanadium That Are Scarce", by A. W. Demmler, metallurgical engineer, Vanadium Corp. of America.

"Function of Manganese That Is Probably Obtainable", by Fred Grotts, president, Fort Pitt Steel Castings Co.

"Function of Molybdenum, Copper, Silicon, Titanium, Phosphorus That Are More Plentiful", (Speaker to be announced).

"Utilization of Classified Scrap and Alloy Pig Iron", by Victor Crosby, foundry engineer, Climax Molybdenum Corp.

"Ultimate Conservation Due to Over-All Economies of Stronger, More Machinable and More Durable Metal", by Victor Crosby, foundry engineer, Climax Molybdenum Corp.

Situation in Various Important Industries:

"Automotive", (Speaker to be announced).

"Railroad", by S. Z. Krumm, metallurgist, Buckeye Steel Castings Co.

"Power", by N. L. Mochel, metallurgical engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"Chemical and Petroleum", by F. B. Foley, superintendent, research department, Midvale Co.

"Machine Tools", by Herman Ewig, foundry manager, Cincinnati Milling Machine Co., Cincinnati.

"Agricultural Machinery", by Hyman Bornstein, chief metallurgist, Deere & Co.

2:30 P.M.—No. 400 Room, Convention Hall

Bearings: Problems, Conservation and Substitution

Leader: O. E. Harder, assistant director, Battelle Memorial Institute.

Summarizer: A. A. Bates, manager, chemical and metallurgical department, Westinghouse Electric & Mfg. Co.

Report from Conservation and Substitution Committee.

"Replacing Tin-Base Babbits by Lead-Base Babbitts", by C. E. Swartz, metallurgist, Cleveland Graphite Bronze Co., 880 East Seventy-second street, Cleveland.

"Bronze Bushings", by E. R. Darby, director of research, Federal Mogul Corp.

"Problems and Substitutes in Powder Metallurgy Bearings", by R. P. Koehring, metallurgist, Moraine Products Division, General Motors Corp.

"Cadmium-Base Bearings", by C. F. Smart, metallurgist, Pontiac Motor Division, General Motors Corp.

"Silver Bearings", by E. A. Ryder, consulting engineer, Pratt & Whitney Aircraft Division.

"Bearing Substitutes in the Automotive Industry", by A. F. Underwood, head mechanic, Research Laboratories Division, General Motors Corp.

"Problems in Aircraft Bearings", (Speaker to be announced).

"The Use of Iron-Copper Bearings",

(*Please turn to Page* 248)

*PATCHES ON SUNDAY PANTS INDICATE HEAVY CONCENTRATION ON PRODUCTION IMPROVEMENT

WHITEY SEZ: *"GOD GAVE MAN TWO ENDS: ONE TO THINK WITH AND ONE TO SIT ON. A MAN'S SUCCESS DEPENDS ON WHICH END HE USES MOST; A CASE OF HEADS YOU WIN AND TAILS YOU LOSE . . . MAURATH STAINLESS ELECTRODES LIKEWISE HAVE TWO ENDS—BOTH VERY BUSINESS-LIKE; BOTH CONTRIBUTING TO THE WELDER'S SUCCESS."*

STAINLESS Type Numbers Available		
302 B	316	330
308	316-Cb	347
309	317	410
309-Cb	321	430
310	325	442
311	329	446
312	•	502
15% Cr—65% Ni.		
20% Cr.—80% Ni.		

HAVE A *SEAT* IN BOOTH D-31 AT THE METAL SHOW—*PATCHES FURNISHED*

MAURATH, Inc.
Builder of better welding

CLEVELAND
electrodes in all analyses

TECHNICAL PROGRAM

Headquarters—Benjamin Franklin Hotel

Monday, Oct. 20

9:00 A.M.—Ballroom, Benjamin Franklin Hotel

Alloy Steels Session

"The Nickel-Molybdenum System," by F. H. Ellinger, General Electric Co., Schenectady, N. Y.

"The Acicular Structure in Nickel-Molybdenum Cast Irons," by R. A. Flinn, American Brake Shoe & Foundry Co., New York; Morris Cohen and John Chipman, Massachusetts Institute of Technology, Cambridge, Mass.

"Elimination of the Apparent Hot Brittleness of 0.50 Molybdenum Steel," by C. L. Clark, Timken Roller Bearing Co., Canton, O.; and J. W. Freeman, University of Michigan, Ann Arbor, Mich.

"Some Properties of Phosphorus-Titanium Steels," by G. F. Comstock, Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

"Wear Tests on Ferrous Alloys," by O. W. Ellis, Ontario Research Foundation, Toronto, Canada.

9:00 A.M.—Washington Room, Benjamin Franklin Hotel

Fabrication Session

"The Effect of Microstructure Upon the Work Hardening Characteristics of a 0.74 Per Cent Carbon Strip Steel," by N. P. Goss and William Brenner Jr., Cold Metal Process Co., Youngstown, O.

"Problems in the Drawability of Deep Drawing Sheets," by M. Asimow, Central Metal Products Co., Los Angeles; and J. N. Crombie, Carnegie-Illinois Steel Corp., Pittsburgh.

"A Study of Cutting Oils with and Without Added Sulphur," by O. W. Boston and J. C. Zimmer, University of Michigan.

"Some Properties of Sintered and Hot Pressed Copper-Zinc Powder Compacts," by C. G. Goetzel, American Electro Metal Corp., Lewiston, Me.

"Homogenization of Copper-Nickel Powder Alloys," by F. N. Rhines and R. A. Colton, Carnegie Institute of Technology, Pittsburgh.

9:00 A.M.—Betsy Ross Room, Benjamin Franklin Hotel

Research Methods Session

"Magnetic Methods for Determining Carbon in Steel," by B. A. Rogers, Karl Wentzel and J. P. Riott, United States Bureau of Mines, Washington.

"Application of Oscillograph to Determination of Cooling Rates of Quenched Steels," by C. R. Austin, R. M. Allen and W. G. Van Note, Pennsylvania State college, State College, Pa.

"The Influence of Alloying Elements on the Critical Points of Steels as Measured by the Dilatometer," by R. N. Gillmor, General Electric Co.

"X-Ray Study of the A_3 Point of Pure Iron Using the Geiger-Muller Counter," by A. P. Wangsgard, University of Utah, Salt Lake City, Utah.

"Heat Etching as a General Method for Revealing the Austenite Grain Size of Steels," by O. O. Miller and M. J. Day, United States Steel Corp., Pittsburgh.

5:00 P.M.—No. 300 Room, Convention Hall

Educational Course

"Heat Flow in Metals," by J. B. Austin, United States Steel Corp. Research Laboratories.

8:00 P.M.—No. 400 Room, Convention Hall

Educational Course

"Hardness and Hardness Measurements," by S. R. Williams, Amherst college, Amherst, Mass.

Tuesday, Oct. 21

9:00 A.M.—Washington Room, Benjamin Franklin Hotel

Hardenability and Physical Properties Session

"Hardenability Testing of Low-Carbon Steels," by R. C. Frerichs and E. S. Rowland, Timken Roller Bearing Co.

"Hardenability of Shallow-Hardening Steels," by C. B. Post, O. V. Greene and W. H. Fenstermacher, Carpenter Steel Co., Reading, Pa.

"The Effect of Carbon Content and Cooling Rate on the Decomposition of Austenite During Continuous Cooling of Plain Carbon Steels," by R. F. Thomson and C. A. Siebert, University of Michigan.

"The Tensile Properties of Pearlite, Bainite and Spheroidite," by M. Gensamer, E. B. Pearsall, W. S. Pellini and J. R. Low Jr., Carnegie Institute of Technology.

"Effects of Initial Structure on Austenite Grain Formation and Coarsening," by M. Baeyertz, Carnegie-Illinois Steel Corp., Pittsburgh.

9:00 A.M.—Ballroom, Benjamin Franklin Hotel

Corrosion and Stainless Steels Session

What Is American Industry's

MORE THAN TWO YEARS have passed since war broke out in Europe. More than 17 months have elapsed since President Roosevelt first called for the mobilization of American resources for defense. It is 11 months since this nation assumed the role of "arsenal for democracy."

Since the date of these commitments the United States has gone a long way toward preparing for large scale defense activity. It has developed an extensive organization for directing and executing the defense program. The army and navy have been expanded greatly. Industry has been shifting gradually from peacetime to defense work until now about 20 percent of its activity is devoted to the defense program.

But everything we have gone through thus far may be considered preliminary to the real effort which lies ahead. The confusion, delays, shortages, bottlenecks, conflicts, mistakes and petty annoyances which have characterized the shifts from a peacetime to an emergency economy are merely the birth pains of a great undertaking.

The *real* defense effort—the honest-to-goodness, all-out program—will be born sometime in the next few months.

★ ★ ★

What will American industry need most to participate to the utmost of efficiency in this effort?

Is it more materials, more man-power, more machines and equipment, better management, better co-ordination, more realistic leadership? Each of these is important. Industry needs the most and the best of all of these things. But even more, it needs one thing that is seldom mentioned in connection with defense.

It needs light. It needs the light of facts for its guidance. It needs more factual information about the specifications of the job ahead.

's Greatest Need Today? . . . .

As the editors of a great industrial publication it is our duty to help provide the light to show the way—the facts to outline the dimensions of the job. Thus far our task has been made difficult by the confusion in planning the defense program, which has been developed by the time-honored method of trial and error. Only now are the dim outlines of objectives beginning to take form.

From now on it will be easier to light the way—easier to interpret Washington's plans in terms of industrial activity—easier to picture the exact share of the big job that will fall upon the shoulders of producers, fabricators, manufacturers, distributors, equipment makers and supply houses.

The developments from day to day which are shaping the specifications of your job are being reported to you each week in STEEL. These reports enable you to find your place in the defense picture as plans for the big drive unfold.

However, it is desirable to get a broad perspective of the defense program—a long-range interpretive view—to augment and supplement the detail of current reports. The 1942 Yearbook Issue of STEEL, to be out January 5, 1942, will provide this perspective. It will furnish a background of understanding against which week-to-week developments will fit and make sense.

The Yearbook issue will constitute "must" reading for those who will carry the brunt of the metalworking industry's contribution to the new-born defense program.

E. L. Shaner

Editor-in-Chief, STEEL

TECHNICAL PROGRAM continued

"The Influence of Stress on the Corrosion Pitting of Steel in Distilled Water," by D. J. McAdam Jr., and G. W. Geil, National Bureau of Standards, Washington.

"The Rate of Formation of Tin-Iron Alloy During Hot Dip Tinning as Measured by a Magnetic Method," by A. U. Seybolt, Battelle Memorial Institute.

"The Role of Nitrogen in 18-8 Stainless Steel," by H. H. Uhlig, General Electric Co.

"The Cyclic Temperature Acceleration of Strain in Heat Resisting Alloys," by G. R. Brophy and D. E. Furman, International Nickel Co., New York.

"Balancing the Composition of Cast 25 Per Cent Chromium, 12 Per Cent Nickel Type Alloys," by J. T. Gow and O. E. Harder, Battelle Memorial Institute, Columbus, O.

9:00 A.M.—Betsy Ross Room, Benjamin Franklin Hotel

Heat Treatment

"Urea Process for Nitriding Steels," by R. P. Dunn, Electro Manganese Corp., Rand tower, Minneapolis; W. B. F. Mackay, Royal Canadian Air Force; and R. L. Dowdell, University of Minnesota, Minneapolis.

"The Kinetics of Graphitization in White Cast Iron," by H. A. Schwartz, National Malleable & Steel Castings Co., Cleveland.

"Effects of Small Amounts of Alloying Elements on Graphitization of High-Purity Hyper-Eutectoid Steels," by C. R. Austin, Pennsylvania State college, and B. S. Norris, United States Pipe & Foundry Co., Burlington, N. J.

"Effect of Cooling Temperature After Carburizing on Reheated and Single Quenched Steel," by O. W. McMullan, Youngstown Sheet & Tube Co., Youngstown, O.

"The Precipitation Reaction in Aged Cold-Rolled Brasses: Its Effects on Hardness, Conductivity and Tensile Properties," by R. H. Harrington and T. C. Jester, General Electric Co.

12:00 Noon—Franklin Room, Benjamin Franklin Hotel

Canadian Luncheon

5:00 P.M.—No. 300 Room, Convention Hall

Educational Course

"Heat Flow in Metals," by J. B. Austin, United States Steel Corp. Research Laboratories.

8:00 P.M.—No. 400 Room, Convention Hall

Educational Course

"Hardness and Hardness Measurements," by S. R. Williams, Amherst college.

Wednesday, Oct. 22

7:30 A.M.—Franklin Room, Benjamin Franklin Hotel

Chapter Chairmen's Breakfast

9:30 A.M.—Ballroom, Benjamin Franklin Hotel

Annual Meeting of the American Society for Metals.

1941 Edward de Mille Campbell Memorial Lecture, by R. F. Mehl, Carnegie Institute of Technology.

12:00 Noon—Benjamin Franklin Hotel

Alumni Luncheons.

5:00 P.M.—No. 300 Room, Convention Hall

Educational Course

"Heat Flow in Metals," by J. B. Austin, United States Steel Corp. Research Laboratories.

8:00 P.M.—No. 400 Room, Convention Hall

Educational Course

"Hardness and Hardness Measurements," by S. R. Williams, Amherst college.

Thursday, Oct. 23

9:00 A.M.—Ballroom, Benjamin Franklin Hotel

Symposium on Controlled Atmospheres

"Fundamental Features of Controlled Atmospheres, Particularly for the Heat Treatment of Steel," by H. W. Gillett and B. W. Gonser, Battelle Memorial Institute.

"Chemical Equilibrium as a Guide in the Control of Furnace Atmospheres," by J. B. Austin and M. J. Day, United States Steel Corp.

"Prevention of Oxidation Type of Reaction of Ferrous Metals," by A. G. Hotchkiss and H. M. Webber, General Electric Co.

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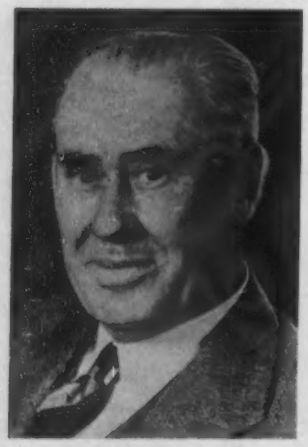
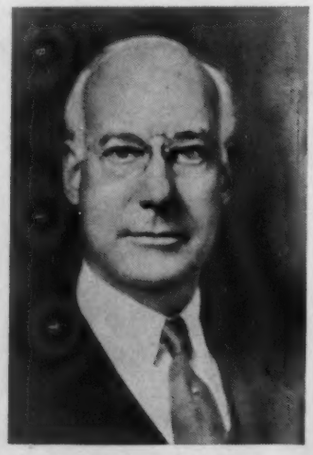


Oscar E. Harder
President, American Society for Metals; Assistant Director, Battelle Memorial Institute, Columbus, O.



Bradley Stoughton
Vice President, American Society for Metals; Dean of Engineering, Lehigh University, Bethlehem, Pa.

Robert F. Mehl
Campbell Memorial Lecturer; Carnegie Institute of Technology, Pittsburgh

William H. Eisenman
Secretary, American Society for Metals; General Manager, National Metal Exposition

DEPENDABILITY *is the essence of industrial planning today. Equipment failure must not interrupt vital defense production schedules.*

Condensers, heat exchangers and many other types of industrial equipment are today meeting emergency demands for maximum output because they have OHIO Quality and Dependability in vital parts.

That same high standard of material and craftsmanship puts OHIO Quality in today's fast fighter planes, bombers, and ships.

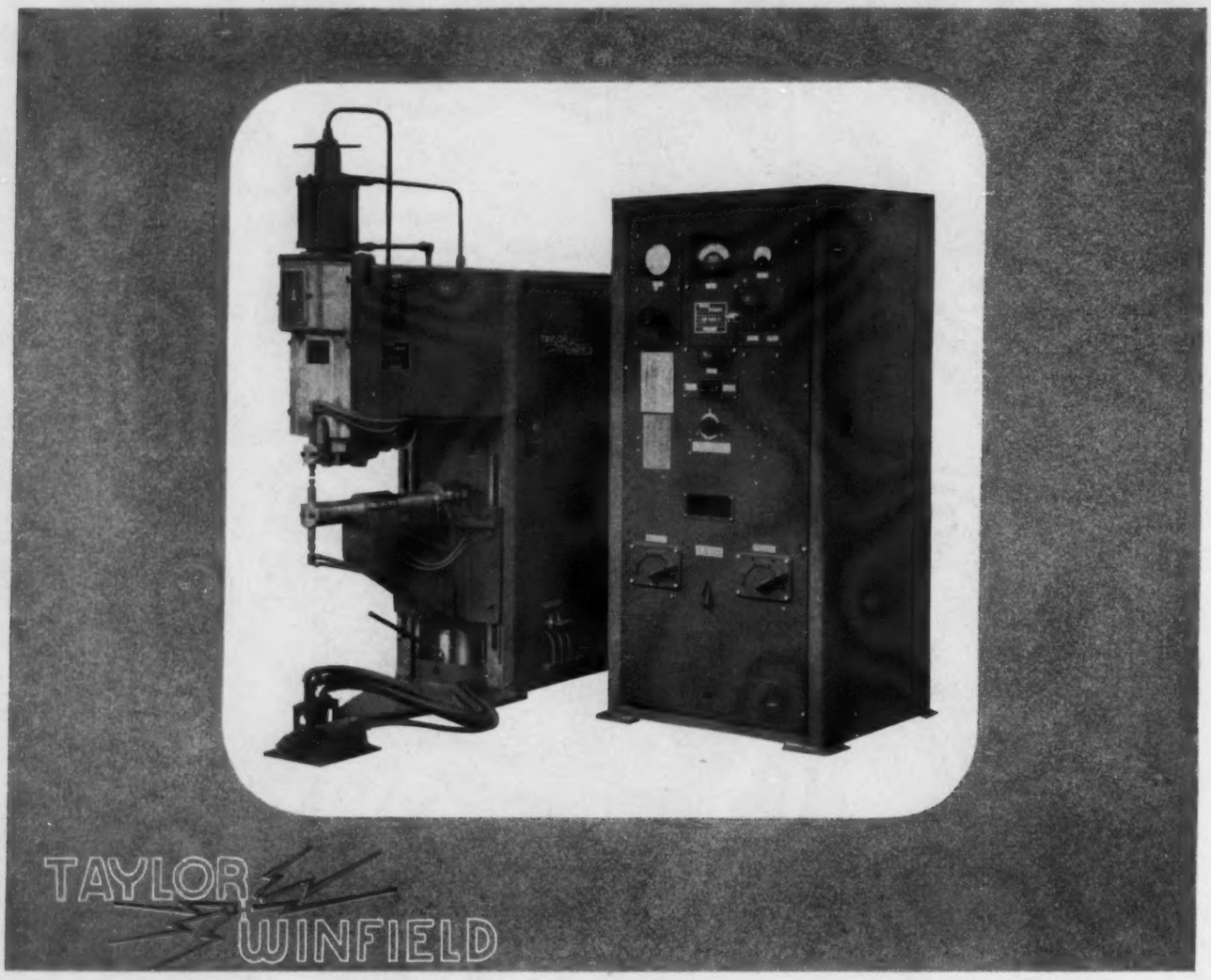
In the air, on sea, and in the heart of industrial plants, OHIO Seamless guards, night and day, against equipment failure.

The OHIO SEAMLESS TUBE CO.

OHIO SPECIAL QUALITY

Shelby, OHIO

SPOT WELDERS FOR AIRCRAFT



WELDERS

THESE ULTRA-MODERN MACHINES WILL BE IN OPERATION AT THIS YEAR'S NATIONAL METAL CONGRESS . . . BOOTH A-1

Improved standards in Spot-Weld Quality have been set by the new TAYLOR-WINFIELD Hi-Wave Welder with Roller Anti-Friction Head. Like other products of TAYLOR-WINFIELD origin, this unit receives the benefit of both design and construction under one responsibility.

With Bellows Air-lock, Retractable Stroke and improved Control Cabinets, the TAYLOR-WINFIELD Hi-Wave Welder is the most refined and completely developed spot welder available. *It is the first American Condenser Discharge Type Machine!* ... Complete details will be mailed upon application.

The TAYLOR WINFIELD Corporation
WARREN, OHIO, U.S.A.

MANUFACTURERS OF
ELECTRIC, BUTT
SPOT AND SEAM
WELDERS

TAYLOR-WINFIELD Welders are manufactured and sold in Canada by COMMONWEALTH ELECTRIC CORPORATION, LTD., Welland, Toronto and Montreal; and in Europe by AB. ASEA SVETSMASKINER, Stockholm, Sweden.

The Denton & Anderson Company — Cleveland, Chicago, Detroit. Other Representatives in principal cities of the U. S.

TECHNICAL PROGRAM

Headquarters, Bellevue-Stratford Hotel

Sunday, Oct. 19

5 TO 7 P.M.—NORTH GARDEN

President's Reception

Monday, Oct. 20

9:30 A.M.—ROSE GARDEN

Opening Session

G. F. Jenks, president, American Welding Society; and E. V. David, chairman, Convention Committee, Chairmen.

Presentation of Medals and Prizes

10:15 A.M.—ROSE GARDEN

Weldability of Plain Carbon and Low-Alloy Steels

O. B. J. Fraser, chairman, Meetings and Papers Committee; and C. H. Jennings, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Chairmen.

"The Specification of Weldability of Steels," by A. B. Kinzel, Union Carbide & Carbon Research Laboratories Inc., New York.

"Weldability Tests of Nickel Steels," by C. E. Jackson and G. G. Luther, Naval Research Laboratory, Anacostia station, Washington.

"Weldability of Steels," by W. H. Bruckner, University of Illinois, Urbana, Ill.

12:00 NOON

Opening Metals Exposition

2:00 P.M.—ROSE GARDEN

Research—Nonferrous

J. R. Dawson, Union Carbide & Carbon Research Laboratories Inc.; and R. B. Swope, Southern Oxygen Co., Arlington, Va., Chairmen.

"Study of the Effect of Core Wire Temper on the Quality of Welds in Monel, Nickel and Inconel," by F. G. Flocke and K. M. Spicer, International Nickel Co., New York.

"The Flow of Metal in Brazing Aluminum," by Dr. M. A. Miller, Aluminum Research Laboratories, New Kensington, Pa.

"Welding of Copper," by A. P. Young, Michigan College of Mining & Technology, Houghton, Mich.

"The Spot Welding of Nickel, Monel and Inconel," by W. F. Hess and Albert Muller, Rensselaer Polytechnic Institute, Troy, N. Y.

2:00 P.M.—SOUTH GARDEN

Shipbuilding

David Arnott, American Bureau of Shipping, New York; and T. M. Jackson, Sun Shipbuilding & Dry Dock Co., Chester, Pa., Chairmen.

"Riveted vs. Welded Galvanized and Corrosion Resisting Steel Smoke Pipes," by H. O. Klinke, U. S. Navy Yard.

"Machine Flame Cutting in Ship Construction," by E. R. McClung and H. L. Wagener, New York Shipbuilding Corp., Camden, N. J.

'Survey of Welding and Cutting in Ship Construction," by F. G. Outcalt and J. M. Keir, The Linde Air Products Company, New York.

Glen F. Jenks
President, American Welding Society; Colonel, Ordnance Department, United States Army, Washington

"Welding Applications in Naval Machinery," by H. W. Hiemke and J. D. Bert, Navy Department, Bureau of Ships.

2:00 P.M.—NORTH GARDEN

Training

A. G. Bissell, Bureau of Ships, Navy Department; and A. F. Davis, Lincoln Electric Co., Cleveland, Chairmen.

"Training of Welding Operators," round-table discussion led by A. G. Bissell, Bureau of Ships, Navy Department.

"A. W. S. Minimum Requirements for the Training of Welding Operators," by L. M. Dalcher, secretary of committee.

"Training Welders for National Defense," by J. A. Waln, agent, Trade and Industrial Education, Defense Training Program, United States Office of Education.

"Training of Oxyacetylene Welding and Cutting Operators," by D. E. Roberts, International Acetylene Association, New York.

7:30 P.M.

Industrial Research Conference

G. F. Jenks, Chairman, presiding

9:00 P.M.

Educational Conference

J. H. Zimmerman, Chairman Educational Committee, presiding.

Tuesday, Oct. 21

9:30 A.M.—SOUTH GARDEN

Fundamental Research—Arc Studies and Heat Flow

F. C. Fyke, Standard Oil Development Co., New York; and H. R. Salisbury, Air Reduction Sales Co., New York, Chairmen.

"Magnetic Arc Blow," by C. H. Jennings and A. B. White, Westinghouse Electric & Mfg. Co.

"Metal Transfer in the Metallic Arc," by L. J. Larson, consulting engineer, Milwaukee.

"Heat Flow in Arc Welding," by E.

A. W. S. Program, continued

M. Mahla, M. C. Rowland, C. A. Shook and G. E. Doan, Lehigh University, Bethlehem, Pa.

9:30 A.M.—Rose Garden

Railroad

A. G. Oehler, associate editor, *Railway Age*, New York; and J. W. Sheffer, American Car & Foundry Co., New York, Chairmen.

"Welding as Applied to Locomotives," by James Partington, American Locomotive Co., New York.

"Design of the World's Largest Welded Flat Car," by H. M. Priest, Railroad Research Bureau, United States Steel Corp.

"Welding Locomotives," by A. J. Raymo, Baldwin Locomotive Works, Philadelphia.

"Pressure Butt Welding of Railroad Rails," by Lem Adams, Oxweld Railroad Service Co., Chicago.

2:00 P.M.—North Garden

Fundamental Research—Testing Methods

H. C. Boardman, Chicago Bridge & Iron Co., Chicago; and E. J. Brady, Alloy Rods Corp., York, Pa., Chairmen.

"Photography of Fusion Welds," by W. T. Tiffin, University of Oklahoma, Norman, Okla.

"Evaluating Welded Joints," by W. F. Hess, Rensselaer Polytechnic Institute.

"Methods of Testing Spot Welds," by R. E. Bowman, War Department, Air Corps.

"Thermal Gradients in Spot Welding Electrodes," by Dr. F. R. Hensel, E. I. Larsen and E. F. Holt, P. R. Mallory & Co., Indianapolis.

2:00 P.M.—Rose Garden

Aircraft and Automotive

C. L. Eksergian, Budd Wheel Co., Detroit; and Peter Altman, Vultee Aircraft Inc., Downey, Calif., Chairmen.

"Automotive Welding," by S. M. Spice, Buick Motor Division, Flint, Mich.; Vaughn Fegley, A-C Spark Plug Co., Flint, Mich.; and L. M. Skidmore, General Motors Institute of Technology, Flint, Mich.

"Production and Quality Control in Aluminum Alloy Spot Welding," by P. H. Merriman, Glenn L. Martin Co., Baltimore.

"Welding in the Aircraft Industry," by F. M. Smith, Stout Skycraft Corp., Dearborn, Mich.

"Condenser Discharge Welding of Aluminum Alloys," by J. W. Dawson, Raytheon Mfg. Co., Boston; and B. L. Wise, Federal Machine & Welder Co., Warren, O.

2:00 P.M.—South Garden

Structural

H. W. Lawson, Bethlehem Steel Co., Bethlehem, Pa.; and W. F. Carson, consulting engineer, Philadelphia, Chairmen.

"Structural Welding," by Van Rensselaer P. Saxe, consulting engineer, Baltimore.

"Design of a Welded Bridge," by G. T. Horton, Chicago Bridge & Iron Co.

"Adapting Design and Construction Methods to welding," by LaMotte Grover, Air Reduction Sales Co.

"Cleveland Liquefied Gas Storage Tanks," by J. O. Jackson, Pittsburgh-Des Moines Steel Co., Pittsburgh.

"Bridge Welding," by T. H. Gardner, Florida East Coast Railway, St. Augustine, Fla.

7:30 P.M.

Fundamental Research Conference

H. C. Boardman, Chairman, presiding.

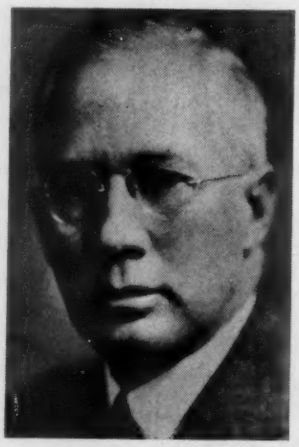
Wednesday, Oct. 22

9:30 A.M.—South Garden

Research—Structural

K. L. Hansen, Harnischfeger Corp., Milwaukee; and G. V. Slottman, Air Reduction Sales Co., Chairmen.

"Tests of Miscellaneous Types of Welded Building Connections," by Bruce Johnston and G. R. Deits, Lehigh University.



T. M. Jackson
Sun Shipbuilding & Dry Dock Co., Chester, Pa.

"An Investigation of Welded Connections for Axially Loaded Angle Members," by G. J. Gibson and B. T. Wake, American Bridge Co., Pittsburgh.

9:30 A.M.—Rose Garden

Automotive and Aircraft

Carl DeGanahl, Fleetwings Inc., Bristol, Pa.; and J. D. Tebben, P. R. Mallory & Co., Chairmen.

"Welding in Aircraft Construction and Maintenance," by A. K. Seemann, The Linde Air Products Co.

"Management Control of Aircraft Design and Welding," by J. P. Dods, Summerill Tubing Co., Bridgeport, Pa.

"A Survey of Aircraft Resistance Welding Equipment," by L. P. Wood, Curtiss Wright Corp., Airplane Division, Buffalo.

2:00 P.M.—South Garden

Resistance Welding Symposium

L. W. Clark, Detroit Edison Co., Detroit; and R. E. Powell, Western Electric Co., New York, Chairmen.

"Structural and Metallurgical Properties of the Condenser Discharge Spot Welds," by G. S. Mikhalapov and T. F. Falls, Taylor-Winfield Corp., Warren, O.

"Pulsation Welding of Heavy Structures," by O. C. Frederick and R. P. McCants, General Electric Co., Schenectady, N. Y.

"The Electrical Characteristics of Resistance Welders and Proximity Effect of Magnetic Work Materials," by J. H. Cooper, Taylor-Winfield Corp.

"Power Control," by H. R. Crago, General Electric Co.

"Forging Welding," by L. M. Benkert, Progressive Welder Co., Detroit.

"Spot-Welding Control and Supervision," by J. R. Fetcher, E. G. Budd Mfg. Co., Philadelphia.

2:00 P.M.—North Garden

Fundamental Research—Metallurgical

H. O. Hill, Bethlehem Steel Co.; and Milton Male, U. S. Steel Corp. of Delaware, Pittsburgh, Chairmen.

"The Effect of Plate Temperature and Variable Wind Velocities on Properties of Carbon-Steel Metal Arc Welds," by J. L. Miller, Firestone Tire & Rubber Co., Akron, O.; and E. L. Koehler, Illinois Institute of Technology, Chicago.

"Welding Aluminum-Containing Steels," by C. E. Sims and F. B. Dahle, Battelle Memorial Institute, Columbus, O.

"Notch Sensitivity of Welds Under Repeated Loading," by H. L. Daasch, University of Vermont, Burlington, Vt.

"The Tee Bend Test as a Method of Determining Weldability of Steel," by G. A. Ellinger and M. L. Williams, United States Bureau of Standards, Washington; and A. G.

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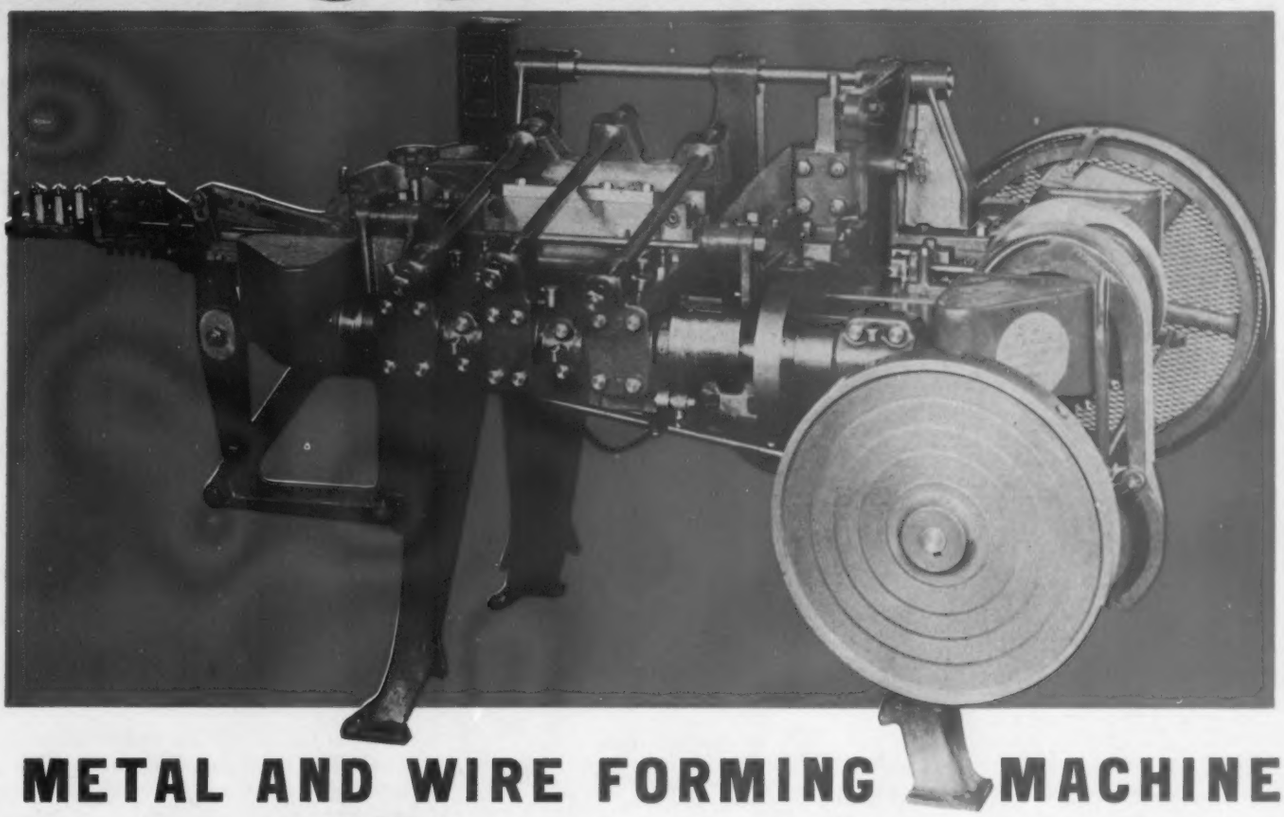

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BRIDGEPORT, CONN., U. S. A.

A. W. S. Program, continued

Bissell, Bureau of Ships, Navy Department.

2:00 P.M.—Rose Garden

National Defense

E. A. Doyle, The Linde Air Products Co.; and C. A. Loomis, Bureau of Ships, Navy Department, Chairmen.

"Training Brazing Instructors for Defense," by Leo Edelson, Handy & Harman, New York.

"Billet Cutting for Steel Forgings," by H. E. Rockefeller, The Linde Air Products Co.

"Machine Cutting in National Defense Work," by R. F. Helmkamp and A. H. Yoch, Air Reduction Sales Co.

"Some Radiographic Aspects of Aluminum Spot Welds," by R. C. Woods and S. L. Rich, Bell Aircraft Corp., Buffalo.

Thursday, Oct. 23

9:30 A.M.—South Garden

Resistance Welding

J. D. Gordon, Taylor-Winfield Corp.; and E. C. Smith, National Electric Welding Machines Co., Bay City, Mich., Chairmen.

"Surface Polish and Contact Resistance," by W. B. Kouwenhoven and J. Tampico, Johns Hopkins University, Baltimore.

"Structural Spot-Welding Consistency Control Methods," by A. M. Unger, Pullman-Standard Car Mfg. Co., Chicago.

"Electrical Measurement of Electrode Pressure During Spot Welding," by W. F. Hess and L. Daniel Runkle, Rensselaer Polytechnic Institute.

9:30 A.M.—Rose Garden

Machinery

C. J. MacGuffie, General Electric Co.; and A. J. Raymo, Baldwin Locomotive Works, Philadelphia, Chairmen.

"Flame Hardening Internal and External Round Surfaces," by Stephen Smith, Air Reduction Sales Co.

"Uses of Flame-Hardening in Machine-Tool Production," by A. L. Hartley, R. K. LeBlond Machine Tool Co., Cincinnati.

"Welding from the Steel Foundryman's Point of View," by J. J. Curran and T. H. Booth, Walworth Co., Greensburg, Pa.

2:00 P.M.

Committee Meetings, and District and Section Officers Conference.

No technical sessions are scheduled in order that the A. W. S. members and guests may have time to view the exhibits.

7:00 P.M.

Annual Banquet

Friday, Oct. 24

9:30 A.M.—South Garden

Piping and Pressure Vessels

D. H. Corey, Detroit Edison Co.; and R. B. Clements, The Linde Air Products Co., Chairmen.

"Flame Preheating and Stress-Relieving Arc-Welded High-Pressure Pipe Lines," by P. T. Onderdonk and Werner Peterson, Consolidated Edison Co. of New York.

"Welding Pressure Vessels, Tanks and Heat Exchangers," by H. B. Schlosser, Edge Moor Iron Works, Edge Moor, Del.

"Radiographic Examination of Heavy Plate," by O. R. Carpenter, Babcock & Wilcox Co., New York.

9:30 A.M.—Rose Garden

Welding of High-Alloy Steels

R. D. Thomas, Arcos Corp., Philadelphia; and L. H. Christensen, Reid Avery Co., Baltimore.

"Hardness Measurements on Rolling Steel That Contained Welds," by J. T. Phillips, Foster Wheeler Co., New York.

"The Shotweld Process of Welding 18-8 Stainless Steel," by Dr. Joseph Winlock and J. J. MacKinney, E. G. Budd Mfg. Co., Philadelphia.

11:30 A.M.

Business Meeting

G. F. Jenks, president, American Welding Society, Chairman.

Annual report of the president, and election and installation of 1941-42 officers.

Board of Directors' Luncheon Meeting.

A. S. M. Program

(*Continued from Page* 236)

"Prevention of Oxidation Type of Reaction in the Heat Treatment of Copper and Its Alloys," by E. G. deCoriolis and William Lehrer, Surface Combustion Corp., Toledo, O.

"The Heat Treatment of the Chromium-Carbon Stainless Steels," by W. E. Mahin and W. C. Troy, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

9:00 A.M.—Betsy Ross Room, Benjamin Franklin Hotel

Physical Properties Session

"The Effect of Strain Rate Upon the Tensile Impact Strength of Some Metals," by E. R. Parker and C. Ferguson, General Electric Co.

"Effect of Grain Size and Heat Treatment Upon Impact Toughness at Low Temperatures of Medium Carbon Forging Steel," by S. J. Rosenberg and D. H. Gagon, National Bureau of Standards.

"Low-Temperature Impact-Resistant Steel Castings," by N. A. Ziegler and H. W. Northrup, Crane Co., Chicago.

"Dynamic Hardness Testing of Metals and Alloys at Elevated Temperatures," by Erich Fetz, C. O. Jelliff Mfg. Corp., Southport, Conn.

9:00 A.M.—Washington Room, Benjamin Franklin Hotel

Metallography of Steel Session

"Microstructural Characteristics of High Purity Alloys of Iron and Carbon," by T. G. Digges, National Bureau of Standards.

"The Structure of Pearlite," by F. C. Hull, Westinghouse Electric & Mfg. Co.; and R. F. Mehl, Carnegie Institute of Technology.

"The Interlamellar Spacing of Pearlite," by G. E. Pellissier, International Nickel Co.; R. F. Mehl and M. F. Hawkes, Carnegie Institute of Technology; W. A. Johnson, Westinghouse Electric & Mfg. Co.

"The Martensite Thermal Arrest in Iron-Carbon Alloys and Plain Carbon Steels," by A. B. Greninger, General Electric Co.

"A Study of Martensite Formation by a Photometric Method," by E. R. Saunders, Union Carbide & Carbon Corp., New York; and J. F. Kahles, University of Cincinnati, Cincinnati.

5:00 P.M.—No. 300 Room, Convention Hall

Educational Course

"Heat Flow in Metals," by J. B. Austin, United States Steel Corp. Research Laboratories.

7:30 P.M.—Ballroom, Benjamin Franklin Hotel

Annual Banquet of the American Society for Metals.

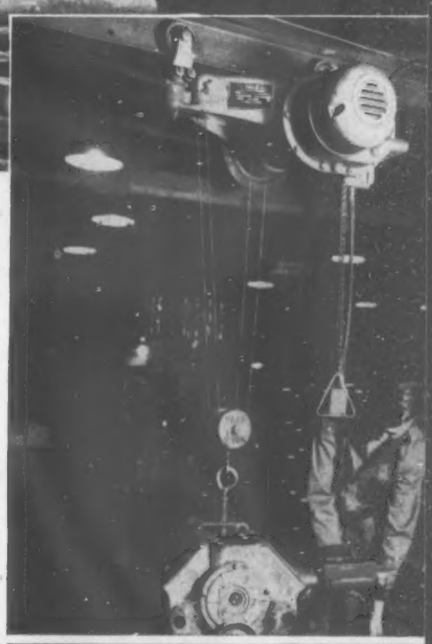
Friday, Oct. 24

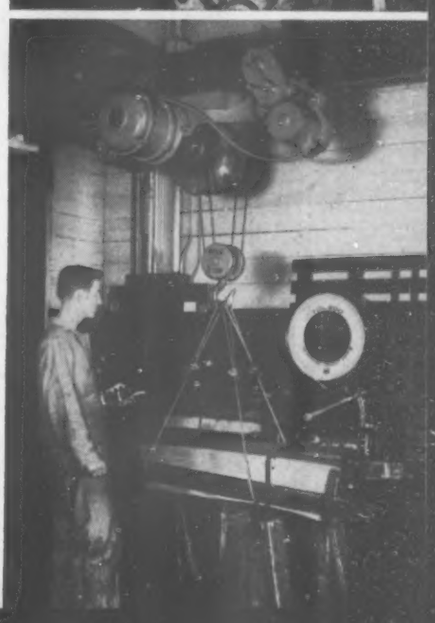
9:00 A.M.—Ballroom, Benjamin Franklin Hotel

Symposium on Controlled Atmospheres

"Atmospheric Control for the Prevention of Decarburization in

(*Please turn to Page* 246)





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Every period of time lost in your plant is a loss item that lowers production output. Now, when things really have to hum to keep up defense production, you need Cable King Wire Rope Electric Hoists.

Cable King's exclusive air-cooling principle allows it to meet today's stepped-up production schedule, accomplish more at less cost, do it longer, better and faster. Cable Kings are built to care for rush periods and take them in their stride.

Your operators will like the Cable King, too, because it is a dependable performer. It has everything . . . speed—long life—adaptability—minimum maintenance, and gives maximum service. There is a Cable King for every job. Capacities: ¼ to 10 tons.

Let your nearest Yale distributor tell you about this Cable King Hoist that's setting new performance standards. Or, write to us for full information.

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See the Yale Materials Handling Equipment Exhibit, Space C-6.

NATIONAL METAL CONGRESS AND EXPOSITION—PHILADELPHIA, PA.—OCTOBER 20 TO 24

BIG RETURNS
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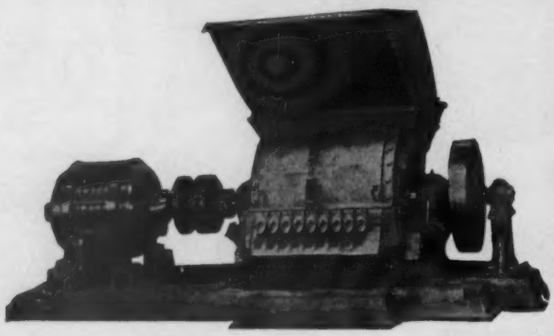
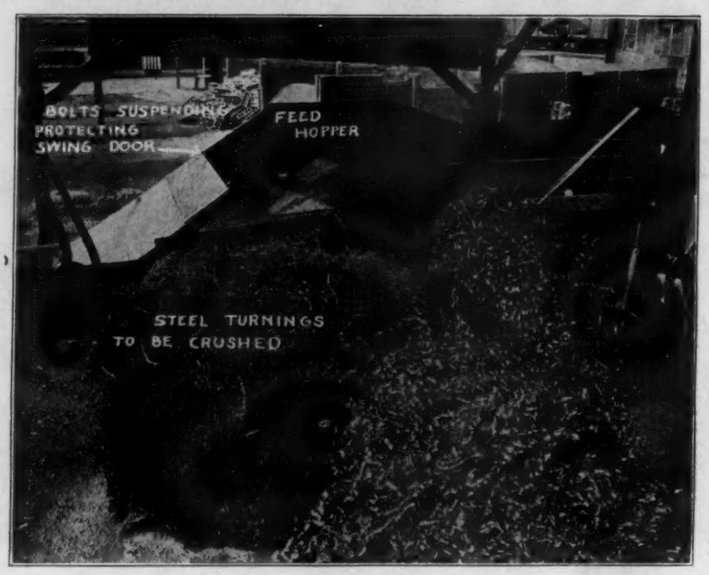


No. 3800 American Steel Turnings Crusher with hopper mounted on bed plate. (Patented)



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Your long turnings will cease to be a nuisance after you put an **AMERICAN RING CRUSHER** on the job. It will pay for itself in a very short time after which it will pay you a steady profit.

Do you want this **EXTRA** profit?

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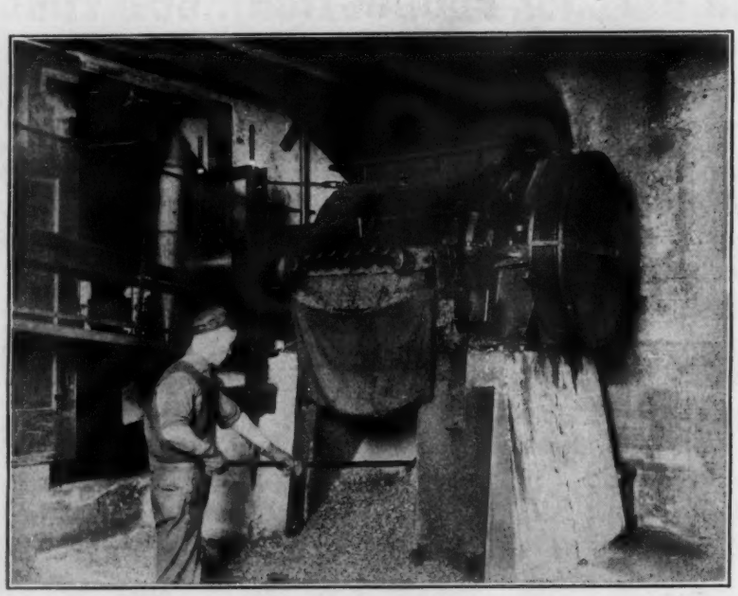
We manufacture a complete line of reduction equipment. Put your problems up to us.



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AMERICAN PULVERIZER CO.

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TECHNICAL PROGRAM

Headquarters—Ritz-Carlton Hotel

Monday, Oct. 20

9:00 A.M.—PALM COURT

Registration

10:00 A.M.—BALLROOM

Institute of Metals Division

Copper and Tin Alloys

C. E. Swartz and E. M. Wise, Chairmen

"Rates of High Temperature Oxidation of Dilute Copper Alloys," by W. A. Johnson, Research Laboratories, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; F. N. Rhines, and W. A. Anderson, Carnegie Institute of Technology, Pittsburgh.

"Effect of Columbium on Some Annealing Characteristics of Copper and 80-20 Cupronickel," by A. U. Seybolt, Battelle Memorial Institute, Columbus, O.

"Recrystallization and Precipitation on Aging of Tin-Bismuth Alloys" by J. E. Burke, Research Laboratories, Norton Co., Worcester, Mass.; and C. W. Mason, Cornell University, Ithaca, N. Y.

"The Ferromagnetic Nature of the Beta Phase in the Copper-Manganese-Tin System," by L. A. Carapella, Naval Research Laboratory, Anacostia, Md.; and R. R. Hultgren, University of California, Berkeley, Calif.

10:30 A.M.—FRENCH ROOM

Technical Session, Iron and Steel Division

Physical Chemistry of Steel Making

C. H. Herty Jr. and John Chipman, Chairmen

"Silicon: Oxygen Equilibria in Liquid Iron," by C. A. Zapffe and C. E. Sims, Battelle Memorial Institute.

"Silicon Monoxide," by C. A. Zapffe and C. E. Sims, Battelle Memorial Institute.

12:15 P.M.—SUPPER ROOM No. 1

Committee on Physical Chemistry of Steel Making, Luncheon Meeting John Chipman, Chairman.

2:00 P.M.—BALLROOM

Joint Session

Physical Metallurgy

S. L. Hoyt and R. M. Bozorth, Chairmen

"Theory of Lattice Expansion Introduced by Cold Work," by Clarence Zener, State College of Washington, Pullman, Wash.

"Rapid Tension Tests Using the Two-Load Method," by A. V. de Forest, C. W. MacGregor and A. R. Anderson, Massachusetts Institute of Technology, Cambridge, Mass.

"A New Method for the Determination of Stress Distribution in Thin-walled Tubing," by George Sachs and G. Espey, Case School of Applied Science, Cleveland.

Tuesday, Oct. 21

10:00 A. M.—BALLROOM

Institute of Metals Division

Brass

D. K. Crampton and L. S. Fletcher, Chairmen

"Effect of Cold Work and Annealing on Internal Friction of Alpha Brass," by Clarence Zener and Howard Clarke, State College of Washington; and C. S. Smith, research metallurgist, American Brass Co., New York.

"Stress Distribution in Sunk Brass Tubing," by George Sachs, G. B. Kasik and G. Espey, Case School of Applied Science.

"Residual Stress in Sunk Cartridge Brass Tubing," by George Sachs and G. Espey, Case School of Applied Science.

"Micrographic Observations of Slip Lines in Alpha Brass," by R. G. Treuting and R. M. Brick, Yale University, New Haven, Conn.

10:00 A.M.—FRENCH ROOM

Iron and Steel Division

Iron and Iron Alloys

Cyril Wells and Samuel Epstein, Chairmen

"A Magnetic Determination of the A_3 Transformation Point in Iron,"

Charles H. Herty Jr.
Chairman, Iron & Steel Division, American Institute of Mining and Metallurgical Engineers

Donald K. Crampton
Chairman, Institute of Metals Division, American Institute of Mining and Metallurgical Engineers

A. I. M. E. Program, continued

by B. A. Rogers and K. O. Stamm, United States Bureau of Mines, Washington.

"Instability of Low-Expansion Iron-Nickel-Cobalt Alloys," by I. R. Kramer and F. M. Walters Jr., Naval Research Laboratory, Anacostia, Md.

"The Evaluation of Ductility of Steels for Welding," by A. B. Kinzel, Union Carbide & Carbon Research Laboratories Inc., New York.

12:15 P.M.—Supper Room No. 1

Executive Committee, Institute of Metals Division, Luncheon Meeting; D. K. Crampton, Chairman.

12:15 P.M.—Supper Room No. 3

Committee on Bessemer Steel, Luncheon Meeting; H. W. Graham, Chairman.

2:00 P. M.—Ballroom

Joint Round Table

C. S. Smith, Institute of Metals Division, and A. B. Kinzel, Iron and Steel Division, Chairmen.

"Order-Disorder Phenomena," Dr. W. B. Shockley, Bell Telephone Laboratories, New York. General discussion.

7:30 P.M.—Ballroom

Annual Autumn Dinner

C. H. Herty Jr., toastmaster; D. K. Crampton responding.

G. K. Bradfield Jr., general superintendent, Ordnance Division, American Car & Foundry Co., on "Building Combat Tanks for the United States Army."

Wednesday, Oct. 22

Morning

There will be no technical sessions of the A. I. M. E. Metals Divisions Wednesday morning so that members may attend the Campbell Memorial lecture of the American Society for Metals.

12:15 P.M.—Supper Room No. 3

Executive Committee, Iron and Steel Division, Luncheon Meeting; C. H. Herty Jr., Chairman.

2:00 P.M.—French Room

Institute of Metals Division

Magnesium and Aluminum Alloys

E. H. Dix Jr. and J. A. Gann, Chairmen

"Relief of Residual Stress in Some Aluminum Alloys," by L. W. Kempf and K. R. Van Horn, Aluminum Research Laboratories, Aluminum Co. of America, Pittsburgh.

"Preferred Orientation in Rolled Magnesium and Magnesium Alloys," by P. W. Bakarian, Dow Chemical Co., Midland, Mich.

"Corrosion Studies of Magnesium and Its Alloys," by J. D. Hanawalt, C. E. Nelson and J. A. Peloubet, Dow Chemical Co.

2:00 P.M.—Ballroom

Iron and Steel Division

Low Alloy Steel

L. S. Bergen and F. B. Foley, Chairmen

"Mechanical Properties of Iron-Manganese Alloys," by F. M. Walters Jr., I. R. Kramer and B. M. Loring, Naval Research Laboratory.

"Influence of Chromium and Molybdenum on Structure, Hardness and Decarburization of 0.35 Per Cent Carbon Steel," by R. F. Miller and R. F. Campbell, Research Laboratory, U. S. Steel Corp., Pittsburgh.

"The S-Curve of a Chromium-Nickel Steel," by B. M. Loring, Naval Research Laboratory.

A. S. M. Program,

(*Continued from Page 242*)

Springs and Similar Products," by J. A. Comstock, Pratt & Whitney Aircraft Division, Hartford, Conn.

"Methods for Determining the Degree of Carburization or Decarburization and Evaluating Controlled Atmospheres," by N. K. Koebel, Lindberg Engineering Co., Chicago.

"Surface Effects Accompanying the Heating of Carbon Tool Steel in Oxidizing Atmospheres," by R. D. Stout and Toivo Aho, Lehigh University, Bethlehem, Pa.

"Discussion of Equipment, Instrumentation and Economy," by E. E. Slowter, Battelle Memorial Institute.

"Atmospheric Control in the Heat Treatment of Aluminum Products," by P. T. Stroup, Aluminum Co. of America, Pittsburgh.

"Atmospheric Control in the Heat Treatment of Magnesium Products," by C. E. Nelson, Dow Chemical Co., Midland, Mich.

9:00 A.M.—Washington Room, Benjamin Franklin Hotel

High-Speed Steels Session

"Electrical Resistance Method for the Determination of Isothermal Austenite Transformations," by F. B. Rote, International Nickel Co.; W. C. Truckenmiller, A-C Spark Plug Division, General Motors Corp., Flint, Mich.; and W. P. Wood, University of Michigan.

"The Tempering of Two High-Carbon, High-Vanadium High-Speed Steels," by B. S. Lement and Morris Cohen, Massachusetts Institute of Technology.

"The Transformation of Retained Austenite in High-Speed Steel at Sub-Atmospheric Temperatures," by M. P. Gordon and Morris Cohen, Massachusetts Institute of Technology.

"Study of Dimensional and Other Changes in Various Die Steels Due to Heat Treatment," by G. M. Butler Jr., Allegheny Ludlum Steel Corp., Pittsburgh.

"Hardening Characteristics of an Iron-Cobalt-Tungsten Alloy," by W. P. Sykes, General Electric Co.

9:00 A.M.—Betsy Ross Room, Benjamin Franklin Hotel

Steelmaking and Research Session

"The Over-All Linear Expansion of Three Face-Centered Cubic Metals (Al, Cu, Pb) from —190 degrees Cent. to Near Their Melting Points," by J. W. Richards, Mt. St. Mary's college, Emmittsburg, Md.

"The Temperature and Manner of Growth of Shatter Cracks in Steel Rails," by H. B. Wishart and E. P. Epler, Carnegie-Illinois Steel Corp.; and R. E. Cramer, University of Illinois, Urbana, Ill.

"The Carbon-Oxygen Equilibrium in Liquid Iron," by Shadburn Marshall, Remington Arms Co., Bridgeport, Conn.; and John Chipman, Massachusetts Institute of Technology.

"The Solubility of Iron Oxide in Liquid Iron," by John Chipman, Massachusetts Institute of Technology; and K. L. Fetters, Carnegie Institute of Technology.

"Rapid Temperature Measurements of Molten Iron and Steel with an Immersion Thermocouple," by Fulton Holtby, University of Minnesota.

2:30 P.M.—No. 300 Room, Convention Hall

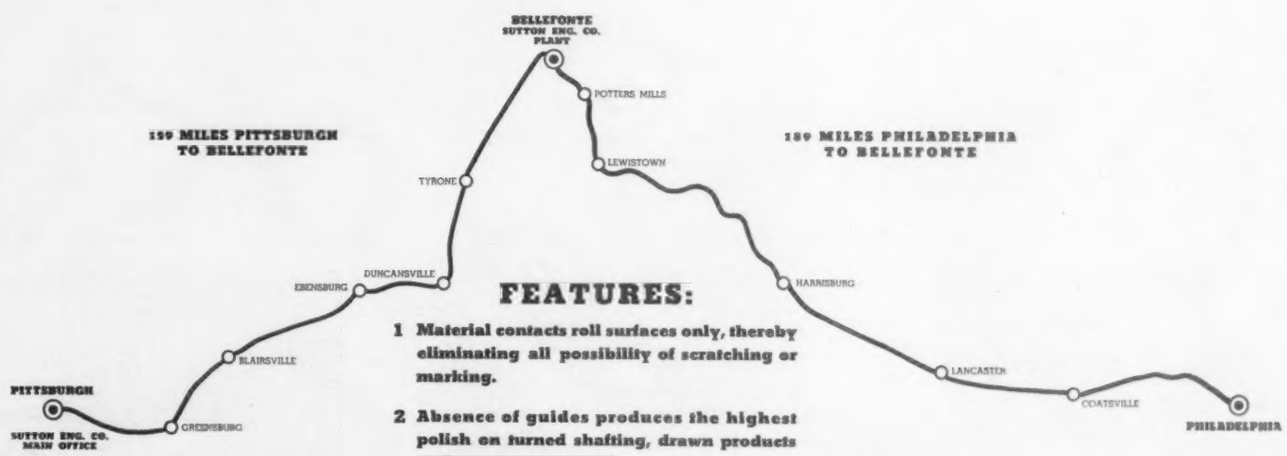
Educational Course

"Heat Flow in Metals," by J. B. Austin, U. S. Steel Corp. Research Laboratories.

Announcement

THE SUTTON ENGINEERING COMPANY

Cordially invites you to be their guests while attending a private demonstration of their new GUIDELESS SEVEN ROLL STRAIGHTENING MACHINE for all grades of ferrous and non-ferrous rounds and tubes, at their plant in BELLEFONTE, PA. ON MONDAY, NOVEMBER 3.



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2. **Absence of guides produces the highest polish on turned shafting, drawn products and non-ferrous metals.**
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6. **This machine combines the best features of our five roll machine and all other standard tube and bar straighteners.**

TECHNICAL PROGRAM

Headquarters—Hotel Philadelphian

Monday, Oct. 20

2:30 P.M.

Opening address, F. A. Westphal, Sheffield Steel Corp., Kansas City, Mo.

"The Cable Industry in National Defense," by K. S. Wyatt, Phelps-Dodge Copper Products Corp., New York.

"Wings of the Army," film supplied by the Air Corps, U. S. Army.

Tuesday, Oct. 21

9:30 A.M.

Mordica Memorial Lecture, by K. B. Lewis, consulting engineer, Worcester, Mass.

"Steel for Ages," sound motion picture by Allegheny Ludlum Steel Corp., Pittsburgh.

1:00 P.M.

National Defense Luncheon

Addresses by Brig. Gen. A. W. N. Schulz; A. A. Stockdale, National Association of Manufacturers, New York; Rear Adm. W. T. Cluverius; Dr. C. I. Gragg Harvard Graduate School of Business Administration and consultant to OPM.

J. K. Beeson
President, Wire Association; Pittsburgh Steel Co., Pittsburgh

4:00 P.M.

Annual Meeting

Wednesday, Oct. 22

9:45 A.M.

"High Speed Rotary Knitting Machine for Covering Electrical Conductors," by S. E. Brillhart, Western Electric Co., New York.

"The Effects of Microstructure on the Galvanizing Characteristics of Steel," by R. W. Sandelin, Atlantic Steel Co., Atlanta, Ga.

"A Brief Discussion of the Manufacture of Steel for Arc Welding Electrodes," by C. W. Garrett, Jones & Laughlin Steel Corp., Pittsburgh.

2:00 P.M.

"Diamond Dies for the High Speed Drawing of Copper Wire," by H. N. Padowicz, Western Electric Co., New York.

"Stainless Wire for the Aircraft Industry," by J. K. Findley, Allegheny Ludlum Steel Corp., Pittsburgh.

"Electrolytic Zinc Coated Wire," by L. H. Winkler, Bethlehem Steel Co., Bethlehem, Pa.

7:30 P.M.

Annual Dinner and Stag Smoker

Thursday, Oct. 23

9:45 A.M.

"Time, Temperature and Size in the Heating of Steel Wire," by R. R. Tatnall, Wickwire Spencer Steel Co., New York.

"Production of Commercial Bronze Screen Cloth Wire," by B. H. McGar, Chase Brass & Copper Co. Inc., Waterbury, Conn.

Friday, Oct. 24

11:30 A.M. — BALLROOM, BENJAMIN FRANKLIN HOTEL

Defense Meeting

2:30 P.M.—BALLROOM, CONVENTION HALL

Molybdenum High-Speed Steels and Tool Steels

Leader: Bradley Stoughton, chief, Heat Treating Equipment Unit, Tools Section, OPM, Washington.

Summarizer: G. V. Luerssen, metallurgist, Carpenter Steel Co.

Report on Alloying Elements from Conservation and Substitution Committee.

"Tool Steels", by J. P. Gill, chief metallurgist, Vanadium-Alloys Steel Co.

OPM Committee Report on the Heat Treatment of Molybdenum High-Speed Steel:

"Operations", N. I. Stotz, metallurgist, Universal-Cyclops Steel Corp., chairman.

"Furnaces and Controlled Atmospheres", C. I. Hayes, president, C. I. Hayes Inc., chairman.

"Salt Baths", A. F. Holden, president, A. F. Holden Co., chairman.

F. A. Westphal
Sheffield Steel Corp., Kansas City, Mo.

Defense Group Meetings Program of the A. S. M.

(*Continued from Page* 231)

by A. J. Langhammer, Amplex Division, Chrysler Corp.

GREATER PRODUCTION *Without* PLANT EXPANSION

Cleaning house cranes eliminate congestion and cut handling time.

In these days when greater and greater production is called for in mills and plants drawing and fabricating wire and rod, Cleveland Tramrail offers a real solution.

Without plant expansion or new building construction your production can be greatly stepped up by modern Cleveland Tramrail methods. Equipment is available for every department.

Cleaning house cranes, block-stripping cranes, hairpin hook carriers and other Cleveland Tramrail equipment streamline the operations, accelerate the production flow, eliminate waste effort and cut costs.

Don't remain hampered! Investigate Cleveland Tramrail. Learn what is being done by others, large and small. Many installations to study.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1125 East 283rd St. Wickliffe, Ohio

Cleveland Tramrail is the leading supplier of block-stripping cranes and carriers for both internal and external stripping.

CLEVELAND TRAMRAIL

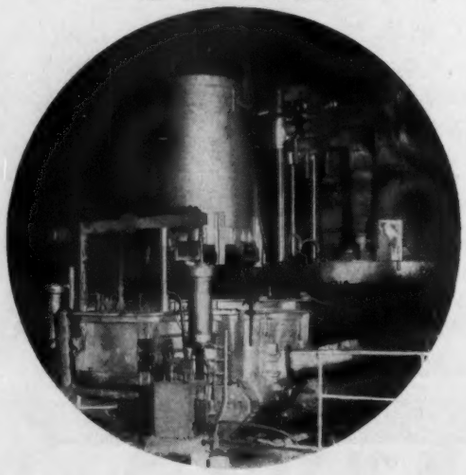
FOR YOUR INCREASED PRODUCTION

MOORE RAPID
Lectromelt
FURNACES

THE LARGEST TOP-CHARGE ELECTRIC FURNACE IN THE U.S.A.

Increased production for Defense is being handled in LECTROMELT equipment. The illustration above shows a 17'-0" diameter size "KT" 50-ton capacity LECTROMELT furnace on plain carbon steel production. Similar capacity equipment is turning out 50 ton heats of alloy steel in another plant. These are the largest top charge furnaces in operation. LECTROMELT furnaces are built in standard sizes from 100 tons down to 25 lbs. capacity. Both top charge and door charge types are available. The top charge type results in savings in power, electrodes, refractories and man hours.

Charging 10-ton LECTROMELT top charge type furnace with drop bottom bucket.



PITTSBURGH LECTROMELT FURNACE CORP.

PITTSBURGH, PA.

Monday . 12:00 M. to 10:30 P.M.

Tuesday . 12:00 M. to 10:30 P.M.

Wednesday 12:00 M. to 10:30 P.M

Thursday . 12:00 M. to 6:00 P.M.

Friday . . 12:00 M. to 10:30 P.M.

A

Abrasive Co., Tacony and Fraley streets, Philadelphia G-39
Grinding wheels and abrasive materials.

Acme Electric Welder Co., Los Angeles.....A-6
Resistance welders.

Acme Industrial Co., Chicago.....H-51
Drill jig bushings.

Adirondack Foundries & Steel Co. Inc., Watervliet, N. Y. 298
Castings.

Advance Polishing Wheels Inc., Chicago G-34
Polishing wheels.

Agfa Ansco Corp., Binghamton, N. Y.....C-56
Photographic materials.

Ajax Metal Corp., Ajax Electric Co. Inc., Philadelphia, **Ajax Electrothermic Corp.,** Trenton, N. J.....211
Heat treating and melting furnaces.

Allen Mfg. Co., Hartford, Conn. B-39
Screws.

Allis-Chalmers Mfg. Co., Milwaukee 86
Low-current arc welders, pumps, motors, speed changers.

Alox Corp., Niagara Falls, N. Y. 62
Corrosion preventatives and lubricants.

Aluminum Co. of America, Pittsburgh; **Aluminum Ore Co.,** East St. Louis, Ill. 52
Aluminum ore and alloys.

Alvey Ferguson Co., Cincinnati C-54
Conveying machinery.

American Allsafe Co., Buffalo A-28
Safety devices and clothing.

American Brake Shoe & Foundry Co., American Manganese Steel Division, Chicago Heights, Ill.....D-23
Alloy castings for heat and corrosion service.

American Brass Co., Waterbury, Conn. 278
Copper alloys; welding rods.

American Car & Foundry Co., New York 270
Electric bar, forging and rivet heaters.

EXHIBITORS and PRODUCTS

American Chain & Cable Co. Inc., Andrew C. Campbell Division, Bridgeport, Conn.; Page Steel & Wire Division, Monessen, Pa.; Reading Steel Casting Division, Reading, Pa. A-27, 298

American Foundry Equipment Co., Mishawaka, Ind. D-61
Airless abrasive cleaning and descaling equipment.

American Gas Association, New York ..... Industrial Gas Exhibit
Industrial gas equipment.

American Gas Furnace Co., Elizabeth, N. J. C
Gas heat treating furnaces; burners, accessories.

American Gasifier Co., Wallingford, Conn. F-54
Furnace gas generator, complete heat treating unit.

American Institute of Mining and Metallurgical Engineers, New York 293
Educational exhibit.

American Machine & Metals Inc., Riehle Testing Machine Division, East Moline, Ill. D-29
Testing machines.

American Magnesium Corp., Cleveland 52
Magnesium and its alloys.

American Metal Market, New York A-19
Publications.

American Rolling Mill Co., Middletown, O. F-31
Specialty iron and steel sheets.

American Society for Metals, Cleveland 215
Educational exhibit, *Metal Progress.*

American Steel Castings Co., Newark, N. J. 298
Steel castings.

American Watchman's Time Detector Co., Morse Magneto Clock Co., 17 East Forty-second street, New York B-35
Watchmen's clocks.

American Welding Society, New York H-43
Educational exhibit.

Ampco Metal Inc., Milwaukee F-50
Welding rods and high-strength nonferrous alloys.

Andresen Inc. B-37
Publications.

Arcos Corp., Philadelphia 12
Welding electrodes.

Armstrong Cork Co., Lancaster, Pa. D-35
Insulating firebrick and cements.

Atlantic Steel Castings Co., Chester, Pa. 298
Steel castings.

Automatic Temperature Control Co. Inc., Philadelphia 31
Valves and controllers.

B

Babcock & Wilcox Co., New York 27
Refractories.

Baker & Co. Inc., Newark, N. J. G-43
Platinum wire, rod and sheet.

Baldwin Locomotive Works, Baldwin-Southwark Division, Philadelphia; Standard Steel Works Division, Philadelphia; **Cramp Brass & Iron Foundries,** Eddystone, Pa.; **Midvale Co.,** Philadelphia E-6
Testing machines and accessories; locomotives; bearings, bushings, castings; large forgings, rolls.

Barrett-Cravens Co., Chicago G-47
Skids, lift trucks and other handling equipment.

Bausch & Lomb Optical Co., Rochester, N. Y. F-46
Optical instruments for metallography, spectrography.

Beals, McCarthy & Rogers Inc., Buffalo 250
Steel mill products.

Bennett Insured Steel Treating Co., Newark, N. J. B-54
Steel heat treating.

Bethlehem Steel Co., Bethlehem, Pa. D-6
Carbon and alloy steels; tool steels; wire.

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa. 298
Steel and iron castings; dies, rolls, presses, machinery.

Black & Decker Mfg. Co., Towson, Md. 44
Portable electric tools.

Black Drill Co., Cleveland B-29
Drills.

Botfield Refractories Co., Philadelphia A-16
Refractories.

Bradley Washfountain Co., Milwaukee B-22
Washfountains and showers.

Bridgeport Brass Co., Bridgeport, Conn. H-38
Brass and copper mill products.

Bristol Co., Waterbury, Conn. 66
Pyrometers; automatic control equipment.

Brown-Wales Co., Boston 250
Steel mill products.

Bruning Co. Inc., Charles; New York A-22
Printing machines.

Brush Development Co., Cleveland 26
Surface smoothness testers.

Bryant Heater Co., Cleveland ..... Q
Furnaces, unit heaters, air conditioners.

Edward G. Budd Mfg. Co., Budd Induction Heating Inc., Philadelphia F-22
Induction heat treating equipment.

Buehler, A. I.; Chicago 30
Metallographic and laboratory equipment.

Burkay Co., Toledo, O. ..... P
No information available.

Butterworth & Sons, H. W.; Bethayres, Pa. H-47
Castings.

C

Callite Tungsten Corp., Union City, N. J. G-54
Wire and wire products of tungsten, molybdenum and nonferrous alloys.

Cambridge Wire Cloth Co., Cambridge, Md. C-17
Conveyor belts; screens; wire cloth; baskets.

Canadian Radium & Uranium Corp., New York C-28
Radiographic equipment.

Carboloy Co. Inc., Detroit E-34
Cemented carbide tools and dies.

Carborundum Co., Niagara Falls, N. Y. 236
Abrasive materials, refractories, nonmetallic electric heating elements.

Carpenter Steel Co., Reading, Pa. 254
Tool and stainless steels.

Central Screw Co., Chicago 220
Screws, bolts, nuts, rivets.

Chapman Valve Mfg. Co., Indian Orchard, Mass. 204
Valves and controls.

Chicago Flexible Shaft Co., Chicago 74
Flexible shaft drives.

Chilton Co., Philadelphia A-54
Publications: *Automotive Industries.*

Cities Service Oil Co., Bartlesville, Okla. F-45
Petroleum products.

Cleveland Overall Co., Cleveland B-16
Safety clothes.

Climax Molybdenum Co., New York D-1
Molybdenum alloy steels and irons.

Coffing Hoist Co., Danville, Ill. C-51
Hoists.

Colonial Alloys Co., Philadelphia G-11
Stainless alloys and products, protective coatings.

Continental Industrial Engineers Inc., Chicago 19
Heat treating furnaces.

Continental Machines Inc., Minneapolis; **Do-All Eastern Machine Co.,** New York; **D. A. Moreinis,** New York B-46
Precision filing and sawing equipment.

Copperweld Steel Co., Glassport, Pa. B-6
Alloy steels.

Crucible Steel Casting Co., Lansdowne, Pa. 298
Steel castings.

D

Deemer Steel Casting Co., Newcastle, Del. 298
Steel castings.

De Sanno & Son, A. P., Phoenixville, Pa. C-30
Abrasive cutting and grinding equipment.

Despatch Oven Co., Minneapolis 4
Gas heat treating furnaces.

Detroit Rex Products Co., Detroit 282
Cleaning equipment.

Detroit Testing Machine Co., Detroit 208
Physical testing machines.

FORGINGS AND STEEL CASTINGS

Builders of ships, engines and machinery are always obliged to watch their tolerances. During the present national defense effort, however, contracts call for astounding tolerances; there is no room for alibis. The various types of forgings manufactured at our works must be machined to a hair better than specified tolerances, so there can be no question. In a matter-of-fact shop, this accuracy would be applauded; in our shops it is taken for granted because it is so essential. ERIE FORGE COMPANY concentrates on steel castings and forgings. Skill, experience and pride is reflected in every manufactured product that leaves our shops . . . . and every ERIE product has boosted our stock with our clients, because every ERIE installation has insured satisfactory operation.

INGOTS
BILLETS
CASTINGS
FORGINGS

ERIE FORGE CO.

ERIE, PENNSYLVANIA

EXHIBITORS and PRODUCTS

Diamond Iron Works, Mahr Mfg. Co. Division, Minneapolis 7
Oil and gas furnaces; burners; nitrogen generators.

Dietert Co., Harry W.; Detroit 258
Spectrographic equipment; testing equipment.

Disston & Sons Inc., Henry; Philadelphia F-58
Saws, knives, files, steel and tools.

Dodge Steel Co., Philadelphia 298
Steel castings.

Dow Chemical Co., Midland, Mich. G-61
Magnesium alloys.

Drever Co., Philadelphia H-22
Industrial heating equipment.

Driver-Harris Co., Harrison, N. J. 214
Heat and corrosion-resisting alloys.

E

Eastman Kodak Co., Rochester, N. Y. H-39
Industrial radiographic and X-ray equipment.

Ecco High Frequency Corp., New York C-38
High-frequency converter equipment.

Eclipse Fuel Engineering Co., Rockford, Ill. ..... H
Gas heat treating furnaces and accessories.

Eisler Engineering Co., Newark, N. J. A-50, A-6
Resistance welders.

Elastic Stop Nut Corp., Union, N. J. G-31
Self-locking nuts.

Electro Manganese Corp., Minneapolis 90
Electrolytic manganese.

Electroloy Co. Inc., New York A-6
Resistance welders.

Empire Steel Castings Co. Inc., Reading, Pa. 298
Steel castings.

Eutectic Welding Alloys Inc., New York A-11
Welding alloys.

Expert Welding Machine Co., Detroit A-6
Welding equipment.

F

Farrand Foundry Corp., Bloomfield, N. J. G-38
Castings.

Farrel-Birmingham Co., Ansonia, Conn. 298
Rolls, machinery and castings.

Federal Machine & Welder Co., Warren, O. A-6
Electric welding machines.

Federal Products Corp., Providence, R. I. 286
Precision measuring instruments.

Fieser-Lundt Inc., New York ..... B
Gas burners and filters; flaring and bending tools.

Firth-Sterling Steel Co., McKeesport, Pa. 98
Carbide tools, dies; stainless, wear-resisting steels.

Foxboro Co., Foxboro, Mass. F-12
Automatic control instruments.

Franklin Institute, Philadelphia 94
Educational exhibit.

G

Gardner Publications Inc., Cincinnati F-57
Publications: *Modern Machine Shop, Products Finishing.*

Gehnrich & Gehnrich Inc., Woodside, L. I., New York ..... M
Ovens, dryers, air heaters.

General Alloys Co., Boston 2
Heat and corrosion-resisting alloys.

General Aniline & Film Corp., Ozalid Products Division, Johnson City, N. Y. H-26
Printing and developing processes.

General Electric Co., Schenectady, N. Y.; General Electric X-Ray Corp., Chicago 230
Electric furnaces; atmosphere producers; welders; X-ray inspection equipment.

General Gas Light Co., Kalamazoo, Mich. ..... T
Gas unit heaters.

General Steel Castings Corp., Eddystone, Pa. 298
Railroad car and locomotive castings.

Gordon Co., Claud S., Chicago 208
Heat treating furnaces; accessories; steel cement.

Great Lakes Steel Corp., Ecorse, Mich. D-56
High tensile alloy steels.

Grob Brothers, Grafton, Wis. H-51
Diemaking equipment, saws, filing machines, brazing devices.

Gulf Oil Corp., Philadelphia G-36
Cutting oils.

H

H & H Research Co., Detroit 222
Portable electric tools.

Hamilton Mfg. Co., Two Rivers, Wis. G-30
Printers' supplies, time card racks.

Handy & Harman, New York C-40
Brazing solders and silver solders.

Hardy Inc., Charles, New York G-13
Metal powders and powder products.

Harnischfeger Corp., Milwaukee 82
Electric welding equipment; motors.

Hartford Electric Steel Corp., Hartford, Conn. 298
Steel castings.

Hauck Mfg. Co., Brooklyn, N. Y. A-23
Oil and gas burners; regulating valves.

Hayes Inc., C. I., Providence, R. I. C-34
Electric heat treating furnaces.

Hevi Duti Electric Co., Milwaukee E-30
Electric heat treating furnaces.

Hild Floor Machine Co., Chicago H-59
Industrial floor cleaning equipment.

Hitchcock Publishing Co., Chicago G-58
Publications.

Hobart Brothers Co., Troy, O. D-39
Arc welding equipment.

Holliday & Co., W. J., Indianapolis F-38
Cold finished steels and shafting.

Holo-Krome Screw Co., Hartford, Conn. E-26
Socket screws.

Hones Inc., Charles A., Baldwin, N. Y. L
Gas furnaces, burners and accessories.

Houghton & Co., E. F., Philadelphia 60
Heat treating salts; lubricants; cutting oil; belting.

Hunt-Spiller Mfg. Co., Boston 298
Air furnace, gun iron castings.

I

Illinois Testing Laboratories Inc., Chicago 76
Pyrometers; thermometers; control equipment.

Independent Pneumatic Tool Co., Chicago C-21
Portable electric and pneumatic tools.

Induction Heating Corp., New York G-26
High-frequency induction equipment.

Industrial Press C-13
Publications.

Industrial Publishing Co. Inc., Cleveland A-26
Publications: *Industry & Welding.*

International Nickel Co. Inc., New York D-26
Nickel and nickel alloys.

Iron Age, New York 296
Publications.

J

Jackson Buff Co., Long Island City, N. Y. H-6
Polishing equipment.

Jessop Steel Co., Washington, Pa. 13
Alloy, stainless and tool steels; clad metals.

Johns-Manville, New York H-12
Insulation materials.

Jones & Laughlin Steel Corp., Pittsburgh 216
Hot and cold finished steels; wires.

K

Kelly-Koett Mfg. Co., Chicago C-57
Industrial X-ray equipment.

Kemp Mfg. Co., C. M., Baltimore I
Gas generators; immersion heating units; accessories.

Kennecott Copper Corp., Chase Brass & Copper Co., Waterbury, Conn. F-30
Copper alloys, welding rods.

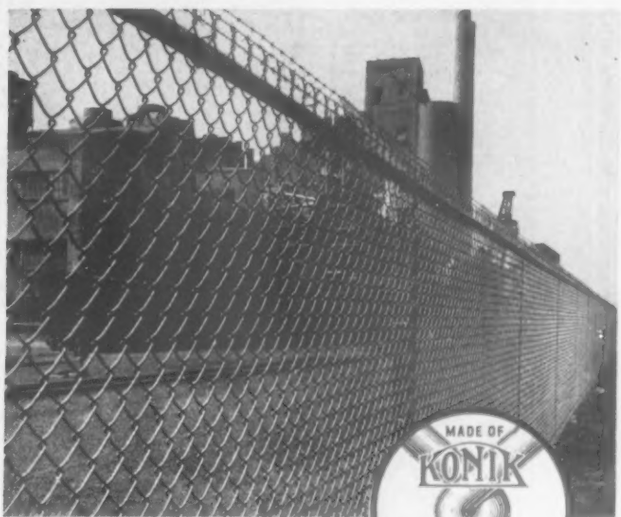
Kent Co. Inc., Rome, N. Y. C-49
Maintenance equipment.

King, Andrew; Narberth, Pa. B-31

Continental Steel

From Continental's plants at Kokomo, Indianapolis and Canton come a wide variety of steel sheets, manufacturer's wire and fabricated wire products such as Chain Link Fence. CONTINENTAL and SUPERIOR sheets are sold under trademarks well known both among manufacturers and sheet metal workers. Continental SUPERIOR wire is made in a vast variety of sizes, shapes, analyses and tempers.

CONTINENTAL STEEL CORP. · KOKOMO, IND.



CONTINENTAL CHAIN LINK FENCE
Extensively used for protection of industrial plants. Made of KONIK steel for strength and rust resistance.

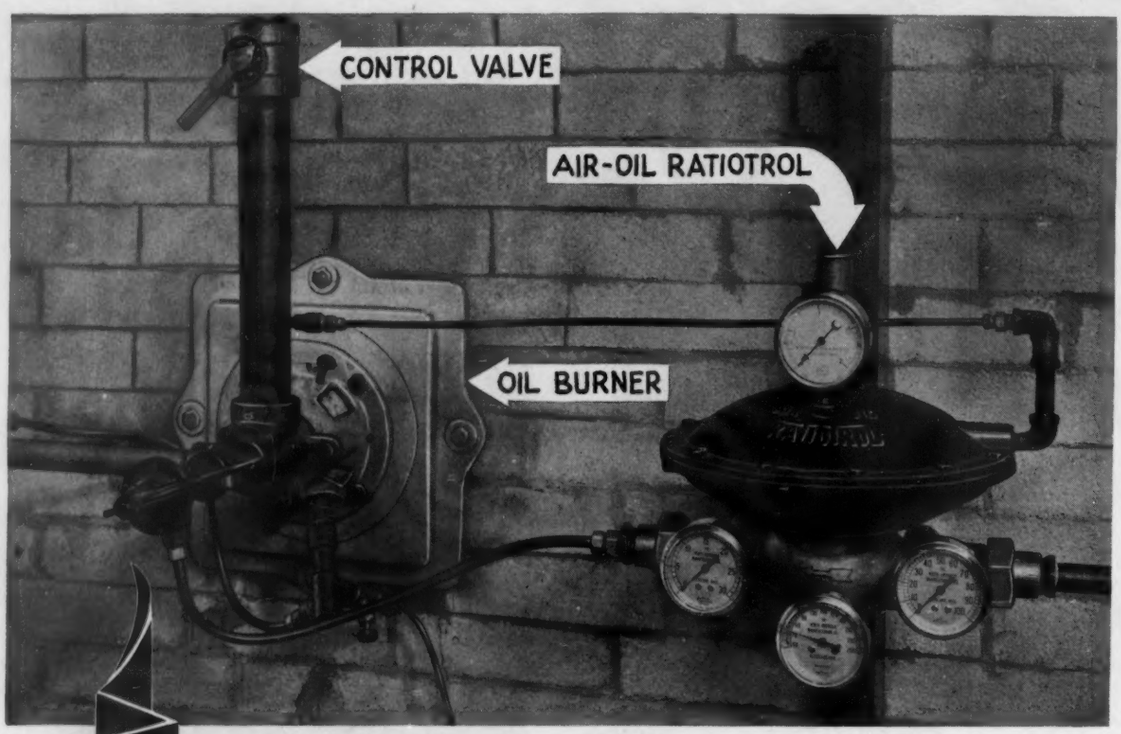
CONTINENTAL AND SUPERIOR SHEETS
Made of commercial and copper-bearing steel in a wide variety of surface finishes and coatings.

CONTINENTAL MANUFACTURER'S WIRE
Sizes from 34 gauge to 5/8-inch, supplied in a wide range of analyses, tempers, shapes and finishes.

CONTINENTAL
STEEL CORPORATION

SHEETS: Black, Galvanized, Copperior, Hot and Cold Rolled, Special Coated, Long Terne, etc.

WIRE: Bright Basic, Annealed, KONIK Coppered, Tinned, Special Manufacturer's, etc.



CONSTANT ATMOSPHERE

maintained by
NORTH AMERICAN AIR-OIL RATIOTROL

In the North American oil burning system pictured above, the *air pressure* at the burner determines the *oil pressure* at the burner. A change in the air control valve — either by hand or by a control motor — will change the amount of fire without changing the flame characteristics.

The Ratiotrol has an adjustable setting which compensates for the amount of constant pressure atomizing air supplied to the burner so that the amount of oil is always proportional to the *entire* amount of air supplied to the burner.

One North American Ratiotrol is ideally suited to automatically control the oil-air ratio for one or a dozen burners. We cordially invite you to call your local North American Engineer, or write the factory for further information.

THE NORTH AMERICAN MANUFACTURING COMPANY

MANUFACTURERS OF INDUSTRIAL FUEL BURNING EQUIPMENT FOR GAS AND OIL

CLEVELAND, OHIO

Portable brinell hardness testing machines.

Krouse Testing Machine Co., Columbus, O. 212
Repeated-stress testing machines.

Kuhlman Electric Co., Detroit Electric Furnace division, Bay City, Mich. E-50
Electric melting furnaces.

L

Latrobe Electric Steel Co., Latrobe, Pa. 15
Castings, tool steels.

Leach Machinery Co., H. B-58
Machine tools.

Lebanon Steel Foundry, Lebanon, Pa. 298
Electric steel castings.

Leeds & Northrup Co., Philadelphia 20
Heat treating furnaces; control instruments.

Lepel High Frequency Laboratories Inc., New York 229
High-frequency converters.

Lewis Machine Co., Cleveland C-58
Wire straightening and cutting machines.

L'Hommedieu & Sons Co., Chas. F., Chicago E-44
Plating and polishing supplies and lathes.

Lincoln Electric Co., Cleveland 40
Arc welding machines; electrodes; motors.

Lindberg Engineering Co., Chicago 68
Heat-treating furnaces; control equipment.

M

Maas & Waldstein Co., Newark, N. J. A-15
Lacquers, enamels, metal finishes.

MacDermid Inc., Waterbury, Conn. G-46
Plating and cleaning compounds.

Machinery, New York 23
Publications.

Machinery Mfg. Co., Los Angeles C-13
Machine tools.

Macklin Co., Jackson, Mich. 274
Grinding wheels, grinders.

Magnaflux Corp., New York A-30
Magnetic inspection equipment.

Magnetic Analysis Corp., Long Island City, N. Y. .. A-12
Magnetic analysis equipment.

Malleable Iron Fittings Co., Branford, Conn. 298
Pipe fittings, castings, galvanizing, tinning.

Mallory & Co. Inc., P. R., Indianapolis 202, A-6
Welding electrode tips; electric contacts.

Manganese Steel Forge Co., Audubon Wire Cloth Corp., Philadelphia D-21
Mesh, space and flexible wire cloth; conveyor belts; screens; rolled and forged manganese steel.

Marburg Brothers Inc., New York 262
Metal cutting machines; gages; pneumatic hammers.

Matchless Metal Polish Co., Chicago G-34
Polishing compounds.

Maurath Inc., Cleveland D-31
Welding electrodes.

McGraw-Hill Publishing Co., New York 3
Publications: *American Machinist, Product Engineering.*

McKay Co., Pittsburgh E-38
Welding electrodes, industrial chains.

McKenna Metals Co., Latrobe, Pa. D-55
Carbide tools, wear resisting parts.

Mears-Kane-Ofeldt Inc., Philadelphia ..... S

Metal & Thermit Corp., New York F-26
Welding electrodes and equipment, high purity metals.

Metal Industry Publishing Co., New York B-56
Publications: *Metal Finishing (Metal Industry).*

Metlab Co., Philadelphia 39
Heat treated products.

Milburn Co., Detroit H-37
Industrial skin protection materials.

Minneapolis-Honeywell Regulator Co., Minneapolis; **Brown Instrument Co. Division**, Philadelphia 63
Controls.

Molybdenum Corp. of America, Pittsburgh E-42
Molybdenum, tungsten alloys; ferroalloys; metal powders.

Motch & Merryweather Machinery Co., Cleveland .. F-41
Metal sawing machines.

Multi-Hydromatic Welding & Mfg. Co., Detroit A-6
Resistance welders.

N

National Electric Welding Machines Co., Bay City, Mich. A-6
Resistance welders.

National Industrial Publishing Co., Pittsburgh B-50
Publications: *Industrial Heating.*

National Machine Works, Chicago ..... N
Heat treating furnaces.

National Time & Signal Corp., Detroit B-63
Timing devices.

Nicholson File Co., Providence, R. I. F-42
Files.

Norton Co., Worcester, Mass. 290
Abrasive products.

O

Oakite Products Inc., New York 226
Cleaners.

Office of Production Management, Division of Contract Distribution, Washington C-22
Educational exhibit.

Ohio Carbon Co., Cleveland F-39
Carbon brushes, contacts, plates, resistors and suppressors.

Ohio Crankshaft Co., Cleveland 264
Electric induction hardening process.

Ohio Seamless Tube Co., Shelby, O. A-7
Welded tubing and sections.

Ohio Steel Foundry Co., Lima, O. 22
Heat and corrosion resisting alloys.

Olsen Testing Machine Co., Tinius; Philadelphia 277
Testing machines and accessories.

P

Packer Machine Co., Meriden, Conn. H-6
Automatic polishing machines.

Pangborn Corp., Hagerstown, Md. C-46
Blast cleaning and dust collecting equipment.

Park Chemical Co., Detroit 279
Heat treating, buffing and polishing materials.

Parker-Kalon Corp., New York G-53
Screws and fastening devices.

Partlow Corp., New Hartford, N. Y. ..... F
Temperature control equipment.

Patterson Co., P. A., Philadelphia C-61
Tools and gages.

Penn Steel Castings Corp., Chester, Pa. 298
Steel castings.

Pennsylvania Electric Steel Castings Co., Hamburg, Pa. 298
Steel castings.

Penton Publishing Co., Cleveland 70
Publications: STEEL, MACHINE DESIGN, DAILY METAL TRADE, THE FOUNDRY, NEW EQUIPMENT DIGEST.

Philadelphia Electric Co., Philadelphia E-58
Industrial power service.

Phillips Mfg. Co., Chicago 266
Cleaning machines.

Physicists Research Co., Ann Arbor, Mich. 291
Surface roughness testers.

Porter Cable Machine Co., Syracuse, N. Y. A-37
Grinders, electric saws, sanders.

Potts Co., Horace T., Philadelphia 250
Iron and steel products.

Progressive Welder Co., Detroit A-6
Resistance welding equipment.

Pulmosan Safety Equipment Corp., Brooklyn, N. Y. H-35
Industrial safety equipment.

Q

Quigley Co. Inc., New York H-30
Refractories.

R

R-S Products Corp., Philadelphia ..... D
Gas heat treating equipment.

Radium Chemical Co. Inc., New York C-55
Radiographic equipment.

EXHIBITORS and PRODUCTS

Ransohoff Inc., N., Cincinnati B-10
Cleaning machines.

Ransome Concrete Machinery Co., Dunellen, N. J. B-17
Revolving welding tables or positioners.

Raybestos-Manhattan Inc., Manhattan Rubber Mfg. Division, Passaic, N. J. B-13
Abrasive cut-off and finishing wheels.

Reeves Pulley Co., Columbus, Ind. A-53
Power drives and variable speed transmissions.

Reinhold Publishing Co., New York A-38
Publications: *Metals and Alloys.*

Republic Steel Corp., Cleveland D-36
Alloy and stainless steels; wire; pig iron.

Resistance Welder Manufacturers' Association, Philadelphia A-6
Information on resistance welding.

Revere Copper & Brass Co., New York 248
Copper and brass alloys and products.

Rhoads & Sons, J. E., Philadelphia A-57
Leather belting, packing, gaskets.

Roebling's Sons Co., John A., Trenton, N. J. H-16
Wire, wire rope, cable.

Ruud Mfg. Co., Pittsburgh ..... O
Water heaters.

Ryerson & Son Inc., Joseph T., Chicago G-17
Alloy steels and steel products.

S

S-M-S Corp., Detroit A-6
Resistance welders.

Salem Engineering Co., Salem, O. I
Furnaces.

Scherr & Co., George, New York A-42
Optical instruments and testing machines.

Schrader's Son, A., Brooklyn, N. Y. B-51
Valves, gages, brass fittings.

Sciaky Corp., Chicago 242
Spot welding equipment.

Selas Co., Philadelphia ..... E
Gas furnaces; burners; controllers.

Sellers Engineering Co., Chicago ..... R
Industrial gas equipment.

Sentry Co., Foxboro, Mass. 8
Hardening furnaces; high-temperature tube furnaces.

Sleeper & Hartley Inc., Worcester, Mass. B-1
Wire and spring making machinery.

Specialties Mfg. Co. Inc., Bloomfield, N. J. G-38
Lathe attachments.

Spencer Turbine Co., Hartford, Conn. 35
Turbo compressors; gas boosters; vacuum cleaners.

Standard Alloy Co., Cleveland 11
Heat and acid resisting alloy diecastings.

Standard Pressed Steel Co., Jenkintown, Pa. A-58
Cap screws, shop equipment, power transmission appliances.

Standard Steel Spring Co., Coraopolis, Pa. 203
Corrosion-proof coatings.

Steel Founders' Society of America, Cleveland 298
Steel casting information.

Steel Publications Inc., Pittsburgh B-33
Publications: *Blast Furnace and Steel Plant, Heat Treating and Forging.*

Stoody Co., Whittier, Calif. E-61
Hard-facing metals.

Stuart & Co., D. A., Chicago C-1
Industrial oils and greases.

Summerill Tubing Co., Bridgeport, Pa. H-29
Aircraft and special tubing.

Superior Tube Co., Norristown, Pa. H-46
Seamless and welded tubing.

Surface Combustion Corp., Toledo, O. ..... J
Gas heat treating furnaces; burners; accessories.

Swift Electric Welder Co., Detroit A-6
Butt, spot and projection welders.

Synthane Corp., Oaks, Pa. G-35
Bakelite and Bakelite products.

T

Tagliabue Mfg. Co., C. J., Brooklyn, N. Y. 225
Pyrometers; thermometers; controllers.

Taylor-Hall Welding Corp., Worcester, Mass. A-6
Resistance welders.

Taylor Winfield Corp., Warren, O. A-1, A-6
Electric welders.

Tempil Corp., New York 28
Hardening and tempering pellets.

Thomson-Gibb Electric Welding Co., Lynn, Mass. A-6
Resistance welders.

Tide Water Associated Oil Co., New York 292
Industrial oils and greases.

Tinnerman Products Inc., Cleveland 45
Fastening devices.

Titanium Alloy Mfg. Co., Niagara Falls, N. Y. F-16
Heat Titanium; ferroalloys; refractories.

Towle & Son Co. 11
Heat resisting alloys.

Treadwell Engineering Co., Easton, Pa. 298
Steel works equipment.

Trent Co., Harold E., Philadelphia A-59
Electric furnaces and heating elements.

Triplex Machine Tool Co., New York B-16
Automatic screw machines, hobbing machines.

Tungsten Electric Corp., Union City, N. J. G-54
Cemented tungsten carbide tools.

U

Una Welding Inc., Cleveland 207
Arc welding machines; electrodes.

United States Steel Corp. of Delaware, Pittsburgh; **American Bridge Co.,** Pittsburgh; **American Steel & Wire Co.,** Cleveland; Cyclone Fence Division, Waukegan, Ill.; **Carnegie-Illinois Steel Corp.,** Pittsburgh; **Columbia Steel Co.,** San Francisco; **National Tube Co.,** Pittsburgh; **Scully Steel Products Co.,** Chicago; **Tennessee Coal, Iron & Railroad Co.,** Birmingham, Ala. ..... Stage
Carbon, alloy, high-tensile and stainless steels; wire and rods; stainless and cold finished strip; steel fence; seamless and welded tubular products.

V

Vulcan Corp. ..... A

Vulcan Iron Works, Wilkes-Barre, Pa. 298
Electric hoists, engines, machinery, steel castings.

W

Wall Colmonoy Corp., Detroit B-55
Hard-facing alloys.

Welding Engineer Publishing Co., Chicago H-53
Publications.

Welding Machines Mfg. Co., Detroit A-6
Portable gun welding equipment.

Welding Sales & Engineering Co., Detroit A-6
Resistance welders.

Wells Mfg. Corp., Three Rivers, Mich. E-54
Metal band saws.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. E-1
Welding equipment; special alloys.

Wheelco Instruments Co., Chicago 41
Pyrometers; thermometers; control equipment.

Whistler & Sons Inc., S. B., Buffalo G-50
Dies, tools and stampings.

Wickwire Spencer Steel Co., New York B-12
Wire and wire products.

Wilson Sales Corp., Lee, Cleveland F-6
Gas-fired furnaces.

Wilson Mechanical Instrument Co. Inc., New York ... 53
Hardness testing machines.

Wire Association, Stamford, Conn. A-34
Educational exhibit, publications: *Wire and Wire Products.*

Y

Yale & Towne Mfg. Co., Philadelphia C-6
Materials handling equipment, hoists, industrial trucks.

Yerger Co., Charles R., Philadelphia H-51
Sawing, filing and lapping machines.

For every service in the Iron and Steel Industry there is a JOHNS-MANVILLE INSULATION specially designed to provide highest operating efficiency, long life and maximum fuel savings - - -

Listed below are brief facts on a few of the most widely used J-M Insulations. For full details, and for information on the free J-M Insulation Engineering Service, write Johns-Manville, 22 East 40th Street, New York, N. Y.

* * *

SUPEREX BLOCKS—The most widely used block insulation for temperatures to 1900° F. Combines high heat resistance with low thermal conductivity. Furnished 3" to 12" wide, 18" and 36" long, from 1" to 4" thick.

J-M INSULATING BRICK AND INSULATING FIRE BRICK—The new complete J-M line offers three types of insulating brick, four types of insulating fire brick. The insulating brick—Sil-O-Cel Natural Brick (for temperatures to 1600° F.); Sil-O-Cel C-22 Brick (for temperatures to 2000° F.); Sil-O-Cel Super Insulating Brick (for temperatures to 2500° F.). The insulating fire brick—JM-16 (for temperatures to 1600° F.); JM-20 (for temperatures to 2000° F.); JM-23 (for temperatures to 2300° F.); JM-26 (for temperatures to 2600° F.). All seven brick provide unusually light weight, low conductivity, ample strength and low cost. Furnished accurately sized in all standard 9" shapes of the 2½" to 3" series, as well as in special sizes.

SIL-O-CEL C-3 CONCRETE—Cast on the job from Sil-O-Cel C-3 aggregate and cement. Sets up into a strong, durable semi-refractory insulating concrete for temperatures up to 1200° F. Crushing strength: 1000 lbs. sq. in.

J-M 85% MAGNESIA BLOCKS AND PIPE INSULATION—Long recognized as the standard material for temperatures to 600° F. Maintains its high insulating efficiency through years of service. Often used in combination with Superex Blocks and Pipe Insulation at temperatures over 600° F. Blocks 3" to 12" wide, 18" or 36" long, 1" to 4" thick. Pipe Insulation in all standard sizes.

ASBESTO-SPONGE FELTED PIPE INSULATION—The most efficient and durable material for temperatures up to 700° F. Also used in combination with Superex Pipe Covering for higher temperatures. Specially suited to the severe conditions encountered in steel-mill service. Furnished in all standard sizes.

(*Concluded from Page* 222)

work, including use of preheating chart; Tempil Pellets and Tempilstiks. Representatives: A. G. Voetter and others.

Booth No. 26—Brush Development Co., 3311 Perkins avenue, Cleveland, will exhibit in operation direct inking oscillographs and surface analyzers. Representatives: H. S. Kartsher, industrial instruments division; C. K. Gravley, chief engineer; A. W. Duffield, sales engineer.

Booth No. 22—Ohio Steel Foundry Co., Lima, O., will exhibit Fahrite heat and corrosion resisting alloy castings. Representatives: T. H. Harvey, vice president; C. E. Malley, sales manager; F. J. Blaney, plant superintendent; D. W. Talbott, assistant plant superintendent; I. D. Cline, advertising manager; F. D. Rice of Philadelphia, E. L. Malone of New York, sales representatives.

Booth No. 19—Continental Industrial Engineers Inc., 201 North Wells street, Chicago, will exhibit photographs of industrial furnaces and equipment. Representatives: W. A. Darrah, president; E. B. Jones, chief engineer; R. A. Hastings, sales manager.

Booth No. 15—Latrobe Electric Steel Co., Latrobe, Pa., will have reception booth. Representatives: Members of sales and metallurgical departments.

Booth No. 20—Leeds & Northrup Co., 4901 Stenton avenue, Philadelphia, will demonstrate Micromax recording controller and Homocarb carburizing method. Representatives: G. W. Tall Jr., manager, E. B. Estabrook, Industrial Sales Division; H. Brewer, manager, T. C. Smith, Market Extension Division; H. F. Boyd; R. A. Dresher; J. C. Emerline; W. A. Lane; L. H. Lansberry; H. N. MacMichael; W. P. Miller; C. H. Parker; H. L. Pfaffhausen; A. M. Redding; W. C. Roxby; C. F. Rudolph; E. C. Wood.

Booth No. 12—Arcos Corp., 401 North Broad street, Philadelphia, will exhibit dipping machine for stainless electrodes, weld metals and sample welds. Representatives: R. D. Thomas, president; R. E. Carriat, secretary; H. N. Ewertz, sales manager; R. D. Thomas Jr., metallurgical engineer; T. H. Nelson, E. C. Shook, salesmen; B. B. Ross, welding engineer; K. W. Ostrom, welding technician.

Booth No. 13—Jessop Steel Co., Washington, Pa., will exhibit stainless-clad steel agitator in operation, Mogul high-speed steel tools, stainless steel finishes. Representatives: R. E. Emery, president; F. T. H. Youngman, vice president and treasurer; T. W. Pennington, sales manager; T. S. Fitch, manager, Composit Steel Division; H. E. Doughty, Philadelphia representative.

A. V. De Forest
Massachusetts Institute of Technology, Cambridge, Mass.

H. J. French
The International Nickel Co.
New York

Booth No. 11—Towle & Son Co. No information available.

Booth No. 11—Standard Alloy Co., 1679 Collamer, Cleveland. No information available.

Booth No. 7—Diamond Iron Works Inc., Mahr Mfg. Co. Division, Minneapolis, will exhibit car-type air draw furnace in operation. Representatives: L. J. Reay, president; W. G. Barstow, vice president; G. C. Winther, chief engineer; A. J. Nordenson, R. M. Hortvet, sales engineers; C. W. Rudolph of Chicago, D. R. Grandy of Cleveland, Joseph Sodoma of Newark, sales representatives.

Booth No. 8—Sentry Co., Foxboro, Mass., will demonstrate high-speed steel hardening in electric furnace and exhibit new larger furnace, Diamond Blocks and accessories. Representatives: Gordon Wheeler, sales manager; P. B. Crocker, treasurer; G. B. Duff, New York and New Jersey district manager, Earle Dudley, assistant; C. W. Rudolph of Chicago, B. M. Brownell of St. Louis, D. W. Grandy of Cleveland, district managers; representatives of R. C. Neal Co. of western New York State, and others.

Booth No. 4—Despatch Oven Co., Minneapolis, will exhibit pot-type furnace, CF horizontal flow batch-type furnace, dismantled fan, and heat treated products. Representatives: H. L. Grapp, executive vice president; F. H. Faber, vice president and sales manager.

Booth No. 3—McGraw-Hill Publishing Co. Publications.

Booth No. 2—General Alloys Co., 367 West First street, Boston, will exhibit carburizing and annealing containers, cyanide and lead pots, furnace hearths, roller rails, heat and acid resistant chain; cyanide dipping baskets, furnace parts, tubes, retorts, and castings. Representatives: H. H. Harris, president; R. D. Carver, general superintendent; R. C. Sutton, director of engineering and metallurgy; L. M. Lindsey, director engineering sales; H. G. Chase, assistant to president; J. J. Donovan, western sales manager; W. J. Fitzpatrick of Philadelphia; T. E. Franks of Chicago; G. O. Desautels of Indianapolis; H. W. Reynolds of Cleveland; A. H. Valentine of Dayton; A. E. Painter of New York; R. E. Lynd of Buffalo; L. J. Edwards of New England; R. E. Chew, vice president Ladd Equipment Co., of Pittsburgh.

Booth 1—Salem Engineering Co., Salem, O. No information available.

C. H. Jennings
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

H. C. Boardman
Chicago Bridge & Iron Co., Chicago

A. B. Kinzel
Union Carbide & Carbon Research Laboratories Inc., New York

C. E. Sims
Battelle Memorial Institute, Columbus, O.

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FOR MACHINING OF ALL KINDS

FIRTHITE SINTERED CARBIDE—*Super* cutting tools.
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XDH, XDM and XDL—Extrusion Die Steels.
LT and LTL—Tungsten Hot Work Steels.
HWD and CYW—Chromium Hot Work Steels.

FOR FATIGUE RESISTING TOOLS

J. S. PUNCH & CHISEL STEEL.
SPECIAL PISTON STEELS.
CHIMO AIR-HARDENING CHISEL STEEL.

FOR CORROSION RESISTANCE

STERLING STAINLESS AND NIROSTA STEELS for bearings, wear parts, etc.

FOR WEAR RESISTING PARTS AND GAUGES

FIRTHITE AND FIRTHALOY SINTERED CARBIDE.

★ ***Complete information about any of these materials available at Booth No. 9, Arena Floor, National Metal Show.***

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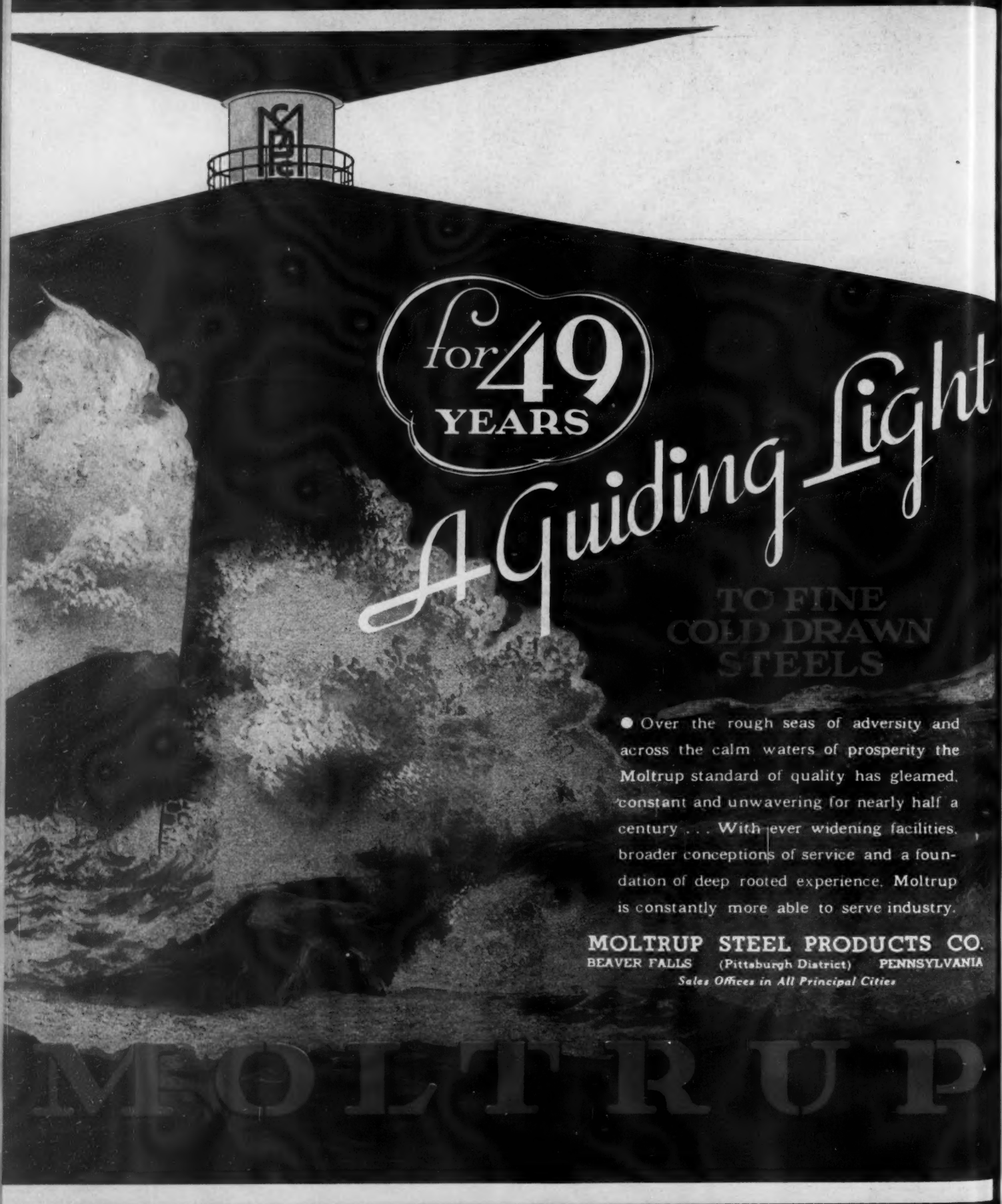
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MOLTRUP STEEL PRODUCTS CO.
BEAVER FALLS (Pittsburgh District) PENNSYLVANIA
Sales Offices in All Principal Cities
MOLTRUP

Impose Full Priority To Ease Scrap Famine

Shortage continues threat to steelmaking. Nine months' steel output nearly equals all 1940. SPAB to control construction.

MARKET IN TABLOID ★

Demand
Continues above production.

Prices
No revision in scrap.

Production
Down 1½ points to 94½ per cent.

■ IMPORTANT action was taken last week to improve the situation in steel and iron scrap, scarcity of which already has caused some curtailment.

General preference order M-24, effective Oct. 11, placed all scrap under full priority. Reports will be required each month for the previous month, from all producers, dealers, brokers and consumers, covering inventory, production, sales and consumption. From these reports a pattern of the market will be developed and a general policy adopted for distribution of scrap under mandatory orders. Priority order No. 1 applies in all its provision as a basis for the new order.

A further factor in the scrap situation is the announcement last week by Leon Henderson, price administrator, that his office is not considering revision of ceiling prices on scrap or change in classification that might raise prices on some grades. This may release any scrap that has been held for expected better prices.

Scrap shortage continues to threaten steel production generally and a number of open hearths already are idle. Many mills have less than a month's supply on hand and consumption outruns receipts.

A growing threat to steel production exists in the labor situation, signalized by the two-day interruption at Chicago last week, which cut the national operating rate 1½ points, representing a substantial tonnage. This may be the start of a concerted drive for the closed shop in the steel industry.

Tightest situation in steel products is in plates and shapes. Estimates of current shipbuilding needs range from 175,000 to 225,000 tons per month and railroad requirements are perhaps second in point of tonnage allocated, though still well below those of shipyards.

Pig iron distribution is proceeding better after two months' experience of allocations. Unduly large inventories are being worked down and while this is proceeding more tonnage is available for smaller melters. Added blast furnace capacity is furnishing greater aggregate tonnage.

SPAB has announced a new policy under which no public or private construction using critical materials may be started during the emergency unless they are necessary for direct national defense or essential to health and safety of the public. The ruling applies to public projects, federal, state and local, commercial, private and utility construction.

Ingot production in September, 6,819,706 net tons, was slightly smaller than in August, the month being shorter and Labor Day intervening. However, average weekly output was larger than in August and was the second highest on record, exceeded only in March, 1941. Production for nine months, 61,550,888 tons, is within 8 per cent of the record-breaking tonnage of the entire year 1940 and 30 per cent above the like 1940 period.

Automobile production last week was 79,065 units, an increase of 2245 over the 76,820 built the previous week. This compares with 107,957 in the corresponding week in 1940. Production apparently is at a rate to meet the reduction from last year's figure set by the government, covering fourth quarter.

Iron and steel imports in July totaled only 1631 gross tons, compared with 3717 tons in June, and seven months imports were 12,339 tons, against 42,178 tons in the same period last year. July scrap imports were 9418 tons, against 6473 tons in June, practically all coming from Cuba.

Warehouses are entering the market in an effort to place orders under the recent quota announcement, in the effort to fill gaps in their stocks. While some dissatisfaction is expressed over the quotas general opinion is that the situation will be bettered and trade served by distributors will be able to obtain better supply.

Steelworks operations last week declined 1½ points, to 94½ per cent, principally a result of the two-day strike at the Gary works of Carnegie-Illinois Steel Corp., which cut the rate in the Chicago district 9½ points to 92 per cent. This district had scheduled 101 per cent for the week. In all but one of the other districts the rate held or increased. Pittsburgh advanced 1 point to 99 per cent, Wheeling 2 points to 96, New England 7 points to 90, Detroit 2 points to 91, Cincinnati 1 point to 82, Buffalo 2½ points to 93 and Cleveland ½-point to 98 per cent. Eastern Pennsylvania lost 1 point to 93 per cent. Unchanged rates were: Birmingham 95 per cent, St. Louis 83 and Youngstown 98.

With ceiling prices still in effect STEEL's composites continue unchanged, finished steel $56.60, iron and steel $38.15 and steelworks scrap $19.16.

COMPOSITE MARKET AVERAGES

	Oct. 11	Oct. 4	Sept. 27	One Month Ago Sept., 1941	Three Months Ago July, 1941	One Year Ago Oct., 1940	Five Years Ago Oct., 1936
Iron and Steel	$38.15	$38.15	$38.15	$38.15	$38.15	$38.07	$34.67
Finished Steel	56.60	56.60	56.60	56.60	56.60	56.60	53.90
Steelworks Scrap..	19.16	19.16	19.16	19.16	19.16	20.70	16.65

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Oct. 11, 1941	Sept. 1941	July 1941	Oct. 1940
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv. Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	Oct. 11, 1941	Sept. 1941	July 1941	Oct. 1940
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$24.34
Basic, Valley	23.50	23.50	23.50	22.50
Basic, eastern, del. Philadelphia	25.34	25.34	25.34	24.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	23.69
No. 2 foundry, Chicago	24.00	24.00	24.00	23.00
Southern No. 2, Birmingham	20.38	20.38	20.38	19.38
Southern No. 2, del. Cincinnati	24.06	24.06	24.06	23.06
No. 2X, del. Phila. (differ. av.)	26.215	26.215	26.215	25.215
Malleable, Valley	24.00	24.00	24.00	23.00
Malleable, Chicago	24.00	24.00	24.00	23.00
Lake Sup., charcoal, del. Chicago	31.34	31.34	31.34	30.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	23.17
Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$21.30
Heavy melt. steel, No. 2, E. Pa.	17.75	17.75	17.75	19.75
Heavy melting steel, Chicago	18.75	18.75	18.75	19.85
Rails for rolling, Chicago	22.25	22.25	22.25	24.05
No. 1 Cast, Chicago	20.00	21.50	21.50	17.55

Coke

Connellsvile, furnace, ovens	$6.25	$6.25	$6.25	$4.75
Connellsville, foundry, ovens	7.25	7.25	7.25	5.75
Chicago, by-product fdry., del.	12.25	12.25	12.25	11.75

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. mill, carloads.

Sheets, Strip

Hot-Rolled Sheets

Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 2.10c
Granite City base 2.20c
Detroit, del. 2.20c
Pacific ports 2.65c

Cold-Rolled Sheets

Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, B'ham., base .. 3.05c
Granite City, base..... 3.15c
Detroit, del. 3.15c
Other Mich. pts., del. ... 2.25c
Pacific ports 3.70c

Galvanized Sheets, No. 24

Pittsburgh, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c
Granite City, base..... 3.60c
Pacific ports 4.05c

Corrugated Galv. Sheets

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, 29 gage, per square 3.31c
Granite City 3.38c
Pacific Ports 3.73c

Culvert Sheets

Pittsburgh, Gary, Birmingham, 16-gage, not corrugated, copper steel 3.60c, copper iron 3.90c, pure iron 3.95c.
Pittsburgh, 24-gage, zinc-coated, hot-dipped, heat-treated 4.25c.
Granite City, copper steel 3.70c, copper iron 4.00c, pure iron 4.05c.
Pacific ports, copper steel 4.25c, copper iron 4.55c, pure iron 4.60c.

Enameling Sheets

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage, base 2.75c
Granite City, base 2.85c
Pacific ports 3.40c
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c
Granite City, base..... 3.45c
Pacific ports 4.00c

Electrical Sheets, No. 24

	Pittsburgh Base	Pacific Ports	Granite City
Field gr.	3.20c	3.95c	3.30c
Armat.	3.55c	4.30c	3.65c
Elect.	4.05c	4.80c	4.15c

Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip

Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c
Detroit, del. 2.20c
Other Mich. pts. del. ... 2.25c
Pacific ports 2.75c

Cold-Rolled Strip

Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less..... 2.80c
Chicago, base 2.90c
Worcester, base 3.00c
Detroit, del. 2.90c
Other Mich. pts. del. ... 2.95c

Commodity C.R. Strip

Pittsburgh, Cleveland, Youngstown, base 3 tons and over..... 2.95c
Worcester, base 3.35c
Detroit, del. 3.05c
Other Mich. pts. del. ... 3.10c

Cold-Finished Spring Steel

Pittsburgh, Cleveland, base; add 20 cents for Worcester.
.26-.50 Carbon 2.80c
.51-.75 Carbon 4.30c
.76-1.00 Carbon 6.15c
Over 1.00 Carbon 8.35c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

TYPE	BARS	PLATES	SHEETS	H. R. STRIP	C. R. STRIP
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
304-20% clad	.....	*18.00	19.00	.....	.....
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
316	40.00	44.00	48.00	40.00	48.00
317	50.00	54.00	58.00	50.00	58.00
347	33.00	38.00	45.00	33.00	42.00
403	21.50	24.50	29.50	21.25	27.00
410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
430F	19.50	22.50	29.50	18.75	24.50
431	19.00	22.00	29.00	17.50	22.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

*Includes annealing and pickling.

Tin, Terne Plate

Tin Plate

Pittsburgh, Chicago, Gary, 100-lb. base box..... $5.00
Granite City $5.10

Tin Mill Black Plate

Pittsburgh, Chicago, Gary, base 29 gage and lighter 3.05c
Granite City 3.15c
Pacific ports, boxed..... 4.05c

Long Ternes

Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c
Pacific Ports 4.55c

Special Coated Mfg. Ternes

Pittsburgh, Chicago, Gary, 100-base box..... $4.30
Granite City $4.40

Roofing Ternes

Pittsburgh base per package 112 sheets 20 x 28 in., coating I.C.

8-lb.	$12.00	25-lb.	$16.00
15-lb.	14.00	30-lb.	17.25
20-lb.	15.00	40-lb.	19.50

Steel Plate

Pittsburgh, Chicago, Gary, Cleveland, Birmingham,

Youngstown 2.10c
Coatesville, Sparrows Point, Claymont 2.10c
Gulf ports 2.45c
Pacific Coast ports 2.65c

Steel Floor Plates

Pittsburgh 3.35c
Chicago 3.35c
Gulf ports 3.70c
Pacific Coast ports 4.00c

Structural Shapes

Pittsburgh, Bethlehem, Chicago, Buffalo, Birmingham 2.10c
St. Louis, del. 2.34c
Pacific Coast ports 2.75c

Bars

Hot-Rolled Carbon Bars

Pittsburgh, Chicago, Gary, Cleve., Birm., base 20 tons one size 2.15c
Detroit, del. 2.25c
New York, del. 2.49c
Duluth, base 2.25c
Philadelphia, del. 2.47c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pac. ports, dock 2.80c
All-rail from Chicago.. 3.25c

Rail Steel Bars

Pitts., Chicago, Gary, Cleveland, Birm., base 5 tons 2.15c
Detroit, del. 2.25c
New York, del. 2.49c
Philadelphia, del. 2.47c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pac. ports, dock 2.80c
All-rail from Chicago.. 3.25c

Hot-Rolled Alloy Bars

Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size 2.70c
Detroit 2.80c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.70	3300	3 80
2500	2.55	3400	3.20
4100 .15-25 Mo.			0.55
4600 0.20-0.30 Mo.; 1.50-2.00 Ni.			1.20
5100 80-1.10 Cr.			0.45
5100 Spr. flats			0.15
6100 Bars			1.20
6100 Spr. flats			0.85
Carb., Van.			0.85
9200 Spr. flats			0.15
9200 Spr. rounds, squares			0.40
T 1300, Mn, mean 1.51-2.00			0.10
Do., carbon under 0.20 max.			0.35

Cold-Finished Carbon Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs. 2.65c
Detroit 2.70c

Cold-Finished Alloy Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 3.35c
Detroit 3.45c
Galveston, add $0.25; Pacific Coast, $0.50.

Turned, Ground Shafting

Pitts., Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c
Detroit 2.70c

Reinforcing Bars (*New Billet*)

Pitts., Chicago, Gary, Cleveland, Birm., Sparrows Point, Buffalo, Youngstown, base 2.15c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pacific ports, dock 2.80c
Detroit, del. 2.25c

Reinforcing Bars (*Rail Steel*)

Pitts., Chicago, Gary, Cleveland, Birm., base. 2.15c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pacific ports, dock 2.80c
Detroit, del. 2.25c

Iron Bars

Philadelphia, com. del. 3.06-3.50c
Pittsburgh, muck bar ... 5.00c
Pittsburgh, staybolt 8.00c
Terre Haute com., f.o.b. mill 2.15c

Wire Products

Pitts.-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails $2.55

(Per Pound)

Polished fence staples .. 2.55c
Annealed fence wire 3.05c
Galv. fence wire 3.40c
Woven wire fencing (base C. L. column) 67
Single loop bale ties, (base C. L. column) .. 59
Galv. barbed wire, 80-rod spools, base column .. 70
Twisted barbless wire, column 70

To Manufacturing Trade

Base, Pitts. - Cleve. - Chicago Birmingham (except spring wire at Birmingham)

Bright bess., basic wire. 2.60c
Galvanized wire 2.60c
Spring wire 3.20c
Worcester, Mass., 10c higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg. $3.85

Alloy Plates (Hot)

Pitts., Chicago, Coatesville, Pa. 3.50c

Rails, Fastenings

(*Gross Tons*)

Standard rails, mill $40.00
Relay rails, Pittsburgh 20—100 lbs. 32.50-35.50
Light rails, billet qual., Pitts., Chicago, Bham. $40.00
Do., rerolling quality.. 39.00

Cents per pound

Angle bars, billet, mills. 2.70c
Do., axle steel 2.35c
Spikes, R. R. base 3.00c
Track bolts, base 4.75c
Do., heat treated 5.00c
Car axles forged, Pitts., Chicago, Birmingham.. 3.15c
Tie plates, base 2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller.....65½ off
Do., ⅞ and ⅝ x 6-in. and shorter .....63½ off
Do., ¾ to 1 x 6-in. and shorter .....61 off
1⅛ and larger, all lengths 59 off
All diameters, over 6-in. long .....59 off
Tire bolts .....50 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts .....56 off
Plow bolts .....65 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less.	62	64
⅝-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger..	56	

Hexagon Cap Screws

Upset 1-in., smaller .....60 off

Square Head Set Screws

Upset, 1-in., smaller ....68 off
Headless, ¼-in., larger ..55 off
No. 10, smaller .....60 off

Piling

Pitts., Chgo., Buffalo .. 2.40c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural 3.75c
⅞-inch and under .....65-5 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. .....$4.00 off

Tool Steels

Pittsburgh, Bethlehem, Syracuse, base, cents per lb.

Carb. Reg. 14.00 Oil-hardening .. 24.00
Carb. Ext. 18.00
Carb. Spec. 22.00 High car.-chr. 43.00

High Speed Tool Steels

Tung.	Chr.	Van.	Moly.	
18.00	4	1	...	67.00
18.00	4	2	1	77.00
18.00	4	3	1	87.00
1.50	4	1	8.50	54.00
....	4	2	8	54.00
5.50	4	1.50	4	57.50
5.50	4.50	4	4.50	70.00

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cutlengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½"O.D.	13	$ 9,72	$23.71
1¾"O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼"O.D.	13	13.79	21.68
2¼"O.D.	12	15.16	....
2½"O.D.	12	16.58	26.57
2¾"O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½"O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1" O.D.	13	$ 7.82	$ 9.01
1¼"O.D.	13	9.26	10.67
1½"O.D.	13	10.23	11.79
1¾"O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼"O.D.	13	14.54	16.76
2¼"O.D.	12	16.01	18.45
2½"O.D.	12	17.54	20.21
2¾"O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½"O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½"O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Welded Iron, Steel, Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

In.	Steel Blk.	Steel Galv.
½	63½	51
¾	66½	55
1—3	68½	57½
	Iron	
¾	30	10
1—1¼	34	16
1½	38	18½
2	37½	18

Lap Weld

	Steel	
2	61	49½
2½—3	64	52½
3½—6	66	54½
7 and 8	65	52½

	Iron	
2	30½	12
2½—3½	31½	14½
4	33½	18
4½—8	32½	17
9—12	28½	12

Line Pipe, Plain Ends

	Steel
1 to 3, butt weld	68½
2, lap weld	63
2½ to 3, lap weld	66
3½ to 6, lap weld	65
7 and 8, lap weld	64

Seamless, 3 pts. lower discount.

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm..$45.00-46.00
4-in., Birmingham .. 48.00-49.00
4-in., Chicago 56.80-57.80
6-in. & over, Chicago 53.80-54.80
6-in. & over, east fdy. 49.00
Do., 4-in 52.00
Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00.

Semifinished Steel

Rerolling Billets, Slabs

(*Gross Tons*)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Youngs., Birm., Sparrows Point..$34.00
Duluth (billets) 36.00
Detroit, delivered 36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm.. 40.00
Duluth 42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago. 34.00
Detroit, delivered 36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅜-inch incl. (per 100 lbs.) $2.00
Do., over ⅜ to 41/64-in. incl. 2.15
Worcester up $0.10, Galveston up $0.25 and Pacific Coast up $0.50 on water shipments.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt. 1.90c

Shell Steel

Pittsburgh, Chicago, base, 1000 tons of one size, open hearth

3-12-inch $52.00
12-18-inch 54.00
18-inch and over 56.00

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur... $6.00- 6.25
Connellsville, fdry.. 7.00- 7.50
Connell. prem. fdry. 7.25- 7.60
New River fdry. .. 8.00- 8.25
Wise county fdry. .. 7.50
Wise county fur. .. 6.50

By-Product Foundry

Newark, N. J., del... 12.60-13.05
Chicago, outside del. 11.50
Chicago, delivered .. 12.25
Terre Haute, del. .. 12.00
Milwaukee, ovens... 12.25
New England, del. .. 13.75
St. Louis, del. 12.02
Birmingham, ovens.. 8.50
Indianapolis, del. .. 12.00
Cincinnati, del. 11.75
Cleveland, del. 12.30
Buffalo, del. 12.50
Detroit, del. 12.25
Philadelphia, del. .. 12.38

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol.... 14.00c
Toluol, two degree 27.00c
Solvent naphtha 26.00c
Industrial xylol 26.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.) 14.25c
Do. (1000 lbs. or over) 13.25c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers 7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia $30.00

Pig Iron

No. 2 foundry is 1.75-2.25 sil.; 50c diff. for each 0.25 sil. above 2.25 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$25.00	$25.50	$24.50	$26.00
Birmingham, Ala.§	20.38	.....	19.38	25.00
Birdsboro, Pa.	25.00	25.50	24.50	26.00
Buffalo	24.00	24.50	23.00	25.00
Chicago	24.00	24.00	23.50	24.50
Cleveland	24.00	24.00	23.50	24.50
Detroit	24.00	24.00	23.50	24.50
Duluth	24.50	24.50	.....	25.00
Erie, Pa.	24.00	24.50	23.50	25.00
Everett, Mass.	25.00	25.50	24.50	26.00
Granite City, Ill.	24.00	24.00	23.50	24.50
Hamilton, O.	24.00	24.00	23.50	.....
Neville Island, Pa.	24.00	24.00	23.50	24.50
Provo, Utah	22.00	.....	.....	.....
Sharpsville, Pa.	24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00
Sparrow's Point, Md.	25.00	.....	24.50	.....
Swedeland, Pa.	25.00	25.50	24.50	26.00
Toledo, O.	24.00	24.00	23.50	24.50
Youngstown, O.	24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00

§Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	25.39	25.39	24.89	25.89
Baltimore from Birmingham†	25.61	.....	25.11	.....
Boston from Birmingham†	25.12	.....	.....	.....
Boston from Everett, Mass.	25.50	26.00	25.00	26.50
Boston from Buffalo	25.50	26.00	25.00	26.50
Brooklyn, N. Y., from Bethlehem	27.50	28.00	.....	.....
Canton, O. from Cleveland	25.39	25.39	24.89	25.89
Chicago from Birmingham	†24.22	.....	.....	.....
Cincinnati from Hamilton, O.	24.44	25.11	24.61	.....
Cincinnati from Birmingham†	24.06	.....	23.06	.....
Cleveland from Birmingham†	24.12	.....	23.12	.....
Mansfield, O., from Toledo, O.	25.94	25.94	25.44	.....
Milwaukee from Chicago	25.10	25.10	24.60	25.60
Muskegon, Mich., from Chicago, Toledo or Detroit	27.19	27.19	.....	.....
Newark, N. J., from Birmingham†	26.15	.....	.....	.....
Newark, N. J., from Bethlehem	26.53	27.03	.....	.....
Philadelphia from Birmingham†	25.46	.....	24.96	.....
Philadelphia from Swedeland, Pa.	25.84	26.34	25.34	.....

Pittsburgh dist.: Add to Neville Island base, North and South Sides, 69c; McKees Rocks, 55c; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, 84c; Monessen, Monongahela City, $1.07; Oakmont, Verona, $1.11; Brackenridge, $1.24.

	No. 2 Fdry.	Malleable	Basic	Bessemer
Saginaw, Mich., from Detroit	26.31	26.31	25.81	26.81
St. Louis, northern	24.50	24.50	24.00	.....
St. Louis from Birmingham	†24.50	.....	23.62	.....
St. Paul from Duluth	26.63	26.63	.....	27.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50, base; $30.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$23.50	Lake Superior fur.	$28.00
Pitts. dist. fur.	23.50	do., del. Chicago	31.34
		Lyles, Tenn., high phos.	28.50

Silvery

Jackson county, O., base, 6.00 to 6.50 per cent $29.50. Add 50 cents for each additional 0.25 per cent of silicon. Buffalo base $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

Manganese differentials in silvery iron and ferrosilicon not to exceed 50 cents per 0.50 per cent manganese in excess of 1 per cent.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$64.60

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00

Second Quality

Pa., Ill., Ky., Md., Mo.	46.35
Georgia, Alabama	38.00
New Jersey	49.00

Ohio

First quality	43.00
Intermediate	36.10
Second quality	36.00

Malleable Bung Brick

All bases	$59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$31.00
Wire cut	29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, duty pd., tide. net ton	nominal
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$23.00
Do., barge	23.00
No. 2 lump	23.00

Ferroalloy Prices

Ferromanganese, 78-82%, Carlots, duty paid, sbd. $120.00
Carlots, del. Pitts. 125.33
Carlots, f.o.b. Southern furn. 145.00
For ton lots add $10, for less-than-ton lots $13.50, for less than 200-lb. lots $18.

Spiegeleisen, 19-21% dom. Palmerton, Pa., spot 36.00

Ferrosilicon, 50%, freight allowed, c.l. 74.50
Do., ton lot 87.00
Do., 75 per cent 135.00
Do., ton lots 151.00
Spot, $5 a ton higher.

Silicomanganese, c.l., 2½ per cent carbon 118.00
1½% carbon 128.00
Contract ton price $12.50 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 1.90-2.00

Ferrovanadium, 35 to 40%, lb., cont. 2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electric furn., per ton, c. l., 23-26% f.o.b. Mt. Pleasant, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 13.00c
Do., ton lots 13.75c
Do., less-ton lots 14.00c
less than 200 lb. lots. 14.25c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	19.50c	20.25c	20.75c
1% carb.	20.50c	21.25c	21.75c
0.10% carb.	22.50c	23.25c	23.75c
0.20% carb.	21.50c	22.25c	22.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Molybdenum Oxide, lb. Molyb. cont., 5-20-lb. containers, f. o. b., Washington, Pa., and Langeloth, Pa., lb. 0.80

Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots $1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb. 1.35
Do., less-ton lots 1.40
Spot 5c higher

Ferrocolumbium, 50-60% contract, lb. con. col., f.o.b. Niagara Falls $2.25
Do., less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton $142.50
Do., spot 145.00
Do., contract, ton lots 145.00
Do., spot, ton lots 150.00

15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50
Do., spot 160.00
Do., contract, ton lots. 160.00
Do., spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do., ton lots 8.00c
Do., less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, freight allowed, lb. carlots, bulk 8.25c
Do., ton lots 8.75c
Do., less-ton lots 9.00c
Do., less 200 lbs. 9.25c
Spot ¼c lb. higher

Tungsten Metal Powder, 98-99 per cent, per lb., depending upon quantity $2.60-2.70

Vanadium Pentoxide, contract, lb. contained $1.10
Do., spot 1.15

Chromium Metal, 98% cr., contract, lb. con. chrome, ton lots 80.00c
Do., spot 85.00c
88% chrome, cont. tons. 79.00c
Do., spot 84.00c

Silicon Metal, 1% iron, contract carlots, 2 x ⅛-in., lb. 14.50c
Do., 2% 13.00c
Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton $74.50
Ton lots 84.50
Less-ton lots, lb. 4.00c
Less 200 lb. lots, lb. 4.25c
Spot ¼-cent higher

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.50c
Ton lots 6.00c
Less-ton lots 6.25c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton 102.50
Do., ton 108.00
35-40%, contract, carloads, lb., alloy 14.00c
Do., ton lots 15.00c
Do., less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60
Do., 100-200 lb. lots 2.75
Do., under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-In. & Over	Structural Shapes	Floor Plates	Sheets Hot Rolled	Sheets Cold Rolled	Sheets Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars Carbon	Cold Drawn Bars S.A.E. 2300	Cold Drawn Bars S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.48	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	5.26	3.31	4.06	8.56	7.10
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.05	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.00	4.92	3.47	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.30	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.85	5.25	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.18	4.23	4.73	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	6.00	....	4.42	....	....
Memphis	4.15	4.35	4.35	4.20	4.20	5.96	4.35	....	6.00	....	4.56	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.80	3.75	....	4.50	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.49	4.49	6.09	4.19	....	5.79	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	3.75	5.95	5.95	4.10	4.10	5.50	4.20	....	5.25	....	7.15	....	....
Seattle	4.00	4.00	5.20	4.75	4.75	6.50	4.75	7.25	6.00	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	5.00	....	5.75	....	....
Los Angeles	4.15	5.45	7.25	4.95	4.95	7.20	5.10	7.30	6.30	....	6.60	11.35	10.35
San Francisco	4.00	5.20	6.80	4.70	4.70	6.40	4.70	7.20	6.45	....	7.05	11.60	10.60

	S.A.E. Hot-rolled Bars (Unannealed) 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	6.45	....	8.75	8.60	9.40
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	9.05
San Francisco	6.05	10.60	9.60	9.45	10.10

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300 pounds and over, Portland, Seattle; 400-14,999 Twin Cities; 400-3999 Birmingham; 400 pounds and over in Memphis; Los Angeles, bars over 4-in. wide, 1-in. thick, 4.95c.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 1 to 10 bun. in Los Angeles; 300 and over in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis ,Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; any quantity in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle, 1 to 99 pounds in Los Angeles; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

EUROPEAN IRON, STEEL PRICES

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b. U.K. Ports	£ s d
Merchant bars, 3-inch and over	$66.50	16 10 0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20 0 0
Structural shapes	2.95c	15 10 0
Ship plates	2.90c	16 2 6
Boiler plates	3.17c	17 12 6
Sheets, black, 24 gage	4.00c	22 5 0
Sheets, galvanized, corrugated, 24 gage	4.61c	25 12 6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.20	1 10 9

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

		£ s d
Foundry No. 3 Pig Iron, Silicon 2.50—3.00	$25.79	6 8 0(a)
Basic pig iron	24.28	6 0 6(a)
Furnace coke, f.o.t. ovens	7.40	1 16 9
Billets, basic soft, 100-ton lots and over	49.37	12 5 0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c	14 10 6
Merchant bars, rounds and squares, under 3-inch	3.17c	17 12 0††
Shapes	2.77c	15 8 0††
Ship plates	2.91c	16 3 0††
Boiler plates	3.06c	17 0 6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22 15 0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26 2 6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	23 15 0
Bands and strips, hot-rolled	3.30c	18 7 0

(a) del. Middlesbrough 5s rebate to approved customers. ††Rebate 15s on certain conditions.

Ores

Lake Superior Iron Ore

Gross ton, 51½%

Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract.	12.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10%	
Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Chinese wolframite, net ton, duty pd.	$24.50-25.00
Brazil iron ore, 68-69%, ord.	7.50c
Low phos. (.02 max.)	8.00c

F.O.B. Rio Janeiro.

Scheelite, imp.	23.50-24.00
Chrome ore, Indian, 48% gross ton	.....

Manganese Ore

Including war risk but not duty, cents per unit cargo lots

Caucasian, 50-52%	.....
So. African, 50%	68.00-70.00
Indian, 50%	68.00-70.00
Brazilian, 46%	68.00-70.00
Chilean, 47%	68.00-70.00
Cuban, 50-51%, duty free	.....

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

OTHER THAN RAILROAD GRADES (a) (b)	Pittsburgh, *Wheeling *Johnstown, Weirton, Steubenville	Youngstown, *Warren, Canton, Sharon	Chicago	Kokomo, Ind.	Bethlehem	*East. Pa.	Sparrows Pt.	Cleveland	Buffalo	*Cincinnati Ashland, Ky. Portsmouth, O. Middletown, O.	St. Louis	Detroit	Duluth	Birmingham	Alabama City, Atlanta	*Pacific Coast	Minnequa, Colo.
No. 1 heavy melting	$20.00	$20.00	$18.75	$18.25	$18.25	$18.75	$18.75	$19.50	$19.25	$19.50	$17.50	$17.85	$18.00	$17.00	$17.00(d)	$14.50	$16.50
No. 1 hyd. comp. black sheets	20.00	20.00	18.75	18.25	18.25	18.75	18.75	19.50	19.25	19.50	17.50	17.85	18.00	17.00	17.00(d)	14.50	16.50
No. 2 heavy melting	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	16.50	16.85	17.00	16.00	16.00(d)	13.50	15.50
Dealer No. 1 bundles	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	16.50	16.85	17.00	16.00	16.00(d)	13.50	15.50
Dealer No. 2 bundles	18.00	18.00	16.75	16.25	16.25	16.75	16.75	17.50	17.25	17.50	15.50	15.85	16.00	15.00	15.00(d)	12.50	14.50
Mixed borings and turnings	15.25	15.25	14.00	14.25	13.50	14.00	14.00	14.75	14.50	14.75	12.75	13.10	.....	12.25	12.25	9.75	11.75
Machine shop turnings	15.50	15.50	14.25	14.50	13.75	14.25	14.25	15.00	14.75	15.00	13.00	13.35	15.50	15.00	15.00	10.00	12.00
Shovel turnings	16.50	16.50	15.25	15.50	14.75	15.25	15.25	16.00	15.75	16.00	14.00	14.35	16.50	16.00	16.00	11.00	13.00
No. 1 busheling	19.50	19.50	18.25	17.75	17.75	18.25	18.25	19.00	18.75	19.00	17.00	17.35	17.50	16.50	16.50	14.00	16.00
No. 2 busheling	15.50	15.50	14.25	13.75	13.75	14.25	14.25	15.00	14.75	15.00	13.00	13.35	13.50	12.50	12.50	10.00	12.00
Cast iron borings	15.75	15.75	14.50	14.00	14.00	14.50	14.50	15.25	15.00	†15.25	13.25	13.60	13.75	12.75	12.75	10.25	12.25
Uncut structurals and plate	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	18.50	16.85	17.00	16.00	16.00	13.50	15.50
No. 1 cupola	21.00	21.00	20.00	20.00	22.50	23.00	22.00	22.00	20.00	21.00	20.00	20.35	19.00	20.00	.....	18.00	.....
Heavy breakable cast	19.50	19.50	18.50	18.50	21.00	21.50	21.00	20.50	18.50	19.50	18.50	18.85	17.50	18.50	.....	17.00	.....
Stove plate	19.00	.....	17.00	16.00	18.00	18.50	18.00	18.00	19.00	17.50	17.00	14.10	16.00	17.00	.....	14.00	.....
Low phos. billet, bloom crops	25.00	25.00	23.75	23.75	23.25	23.75	23.75	24.50	24.25	23.50	22.50	22.85	23.00	22.00	.....	19.50	.....
Low phos. bar crops and smaller	23.00	23.00	21.75	21.75	21.25	21.75	21.75	22.50	22.25	21.50	20.50	20.85	21.00	20.00	.....	19.50	.....
Low phos. punch., plate scrap**	23.00(c)	23.00	21.75	21.75	21.25	21.75	21.75	22.50	22.25	21.50	20.50	20.85	21.00	20.00	.....	17.50	.....
Machinery cast cupola size***	22.00	22.00	21.00	21.00	23.50	24.00	23.50	23.00	21.00	22.00	21.00	21.35	20.00	21.00	.....	19.00	.....
No. 1 machine cast, drop broken, 150 pounds and under	22.50	22.50	21.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50	21.50	21.85	20.50	21.50	.....	19.50	.....
Clean auto cast	22.50	22.50	21.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50	21.50	21.85	20.50	21.50	.....	19.50	.....
Punchings and plate scrap‡‡	22.00(c)	22.00	20.75	20.75	20.25	20.75	20.75	21.50	21.25	20.50	19.50	19.85	20.00	19.00	.....	16.50	.....
Punchings and plate scrap§§	21.00(c)	21.00	19.75	19.75	19.25	19.75	19.75	20.50	20.25	19.50	18.50	18.85	19.00	18.00	.....	15.50	.....
Heavy axle and forge turnings	19.50(c)	19.50	18.25	18.25	17.75	18.25	18.25	19.00	18.75	18.00	17.00	17.35	17.50	16.50	.....	14.00	.....
Medium heavy elec. furnace turnings	18.00(c)	18.00	16.75	16.75	16.25	16.75	16.75	17.50	17.25	16.50	15.50	15.85	16.00	15.00	.....	12.50	.....
GRADES ORIGINATING FROM RAILROADS															Kansas City		
No. 1 R.R. heavy melting steel	21.00	21.00	19.75	19.25	.....	19.75	19.75	20.50	20.25	20.50	18.50	18.85	19.00	18.00	17.00	15.50	.....
Scrap rails	22.00	22.00	20.75	20.25	.....	20.75	20.75	21.50	21.25	21.50	19.50	19.85	20.00	19.00	18.00	16.50	.....
††Rerolling quality rails	23.50	23.50	22.25	21.75	.....	22.25	22.25	23.00	22.75	23.00	21.00	21.35	21.50	20.50	19.50	18.00	.....
Scrap rails 3 feet and under	24.00	24.00	22.75	22.25	.....	22.75	22.75	23.50	23.25	23.50	21.50	21.85	22.00	21.00	20.00	18.50	.....
Scrap rails 2 feet and under	24.25	24.25	23.00	22.50	.....	23.00	23.00	23.75	23.50	23.75	21.75	22.10	22.25	21.25	20.25	18.75	.....
Scrap rails 18 inches and under	24.50	24.50	23.25	22.75	.....	23.25	23.25	24.00	23.75	24.00	22.00	22.35	22.50	21.50	20.50	19.00	.....

*Johnstown, Pa., Warren, O., and Cincinnati, O., not bases for railroad grades; Wheeling railroad only. Eastern Pa. includes Coatesville, Claymont, Conshohocken, Phoenixville and Harrisburg as bases only for "other than railroad grades"; Philadelphia and Wilmington are bases only for railroad grades. Pacific Coast bases are Los Angeles, San Francisco, Seattle, Portland. †Base price at Portsmouth; Middletown 25 cents less and Ashland, Ky; ††The term 'rails for rerolling' includes any rails which are sold to be used for rerolling, irrespective of whether or not such rails are usable for re-laying. **⅜-inch and heavier, cut 12 inches and under; ***may include clean agricultural cast; ‡‡under ⅜-inch to ¼-inch, cut 12 inches and under; §§under ¼-inch to No. 12 gage, cut 12 inches and under. (c) add $1.75 at Pittsburgh. (d) Bases at Atlanta only.

OTHER BASE PRICES: Machine shop turnings $17.60, Alloy, W. Va., $13.35 Toledo, O.; **Shoveling turnings,** $14.35 Toledo; **cast iron borings,** $13.60 Toledo; **No. 1 cupola cast,** $19 Minneapolis and St. Paul, $20.50 Chattanooga, $21 Radford, Va. and $22 Phillipsdale, Bridgeport and Worcester; **Heavy breakable cast,** $20.50 Phillipsdale, Bridgeport and Worcester, $17.50 Minneapolis and St. Paul; **Stove plate** $16 Minneapolis and St. Paul, $17.50 Chattanooga, $18 Radford, Va., $15.60 Toledo and $17.50 Phillipsdale, Bridgeport and Worcester; **Machinery cast cupola size** $21.50 Chattanooga, $22 Radford, Va. and $23 Phillipsdale, Bridgeport and Worcester; **No. 1 machinery cast, drop broken** $22 Chattanooga, $22.50 Radford, Va. and $23.50 Phillipsdale, Bridgeport and Worcester; **Clean auto cast** $22 Chattanooga, $22.50 Radford, Va. and $23.50 Phillipsdale, Bridgeport and Worcester.

(a) The grades specified are, except dealers' No. 1 and No. 2 bundles and uncut structural and plate scrap, as named and defined in the simplified recommendations R-58-36 of the Department of Commerce which shall be the governing specifications for iron and steel scrap hereunder (other than railroad grades). Dealers' No. 1 bundles shall consist of new, clean black sheet scrap, hydraulically compressed in the dealer's yard. Dealers' No. 2 bundles shall consist of old fender and body scrap, and shall in no case command a premium. (b) These grades (other than railroad grades) represent the major classifications of iron and steel scrap. The maximum prices of superior or inferior grades shall continue to bear the same comparable relationship to those major grade classifications as heretofore existed between the prices of such superior or inferior grades and the prices of the major grades.

Maximum price at shipping point: A shipping point is the point from which the scrap is to be shipped to a consumer. Maximum price at which a grade of scrap may be sold f.o.b. its point of shipment is the shipping point of such scrap. **For shipping points located within a basing point,** the shipping point price is determined by taking the basing point price and deducting actual transportation costs to the consumer's plant within the basing point. **For shipping points outside a basing point,** the shipping point price is determined by taking the nearest basing point and subtracting the lowest transportation charge. (Example: No. 1 steel shipped from Toledo takes the Detroit base of $17.85 minus transportation of $1.52 or $16.33. This shipping point price is the same to all consumers wherever located.) **Exceptions:** Shipping point of any grade not listed as having a basing point in New England is the Johnstown base minus the all-rail freight from the shipping point to Johnstown. Shipping point prices for New York City, Brooklyn, New York and New Jersey must be computed on the basis of the Bethlehem base although nearer to Buffalo in terms of barge transportation.

Maximum prices to consumers: Maximum price at which any grade (other than railroad) may be delivered to a consumer wherever located is the shipping point price plus actual transportation charges. Where shipment is by water, not more than 75 cents per gross ton may be included for handling charges at dock. Maximum delivered price in no case shall exceed by $1 a ton the nearest maximum base price in terms of transportation charges. (Example: The $1 excess is the so-called "springboard" arrangement. Youngstown consumers can draw on the Cleveland area for No. 1 steel scrap by taking the Cleveland base of $19.50, subtracting the Cleveland switching charge of 65 cents and adding freight to Youngstown of $2.08. The resulting delivered figure of $20.93 is within the "springboard" limit of $1 over the Youngstown base of $20.)

Billet and bloom crops originating in the Pittsburgh district may be sold within or without the district at the Pittsburgh base price plus up to, but not more than $2.50 in transportation charges. Maximum prices for **unprepared scrap** shall be $2.50 a ton less than the maximums for corresponding grade or grades of prepared scrap. **Remote scrap** is material located beyond the zone from which the railroad freight rate to Pittsburgh is $11.20 and a consumer may obtain permission from OPACS to absorb transportation charges necessary to obtain 500 tons or more.

Railroad grades: Where a railroad operates in two or more basing points, the highest base applies to consumers anywhere on the line. (Example: New York Central Railroad uses the $21 Pittsburgh base on No. 1 steel since the P. & L. E. operates there). Exception: Switching charges of 84 cents a ton must be subtracted from prices on scrap originating from railroads operating in Chicago and sold for consumption outside Chicago. Where railroad scrap is shipped to an off-the-line consumer, the highest maximum on-the-line price or the nearest basing point price, whichever is higher, applies.

Commissions: Brokers are allowed a commission up to 50 cents a ton above maximum prices to consumers, including export.

Export prices: Maximum on No. 1 heavy melting steel (other than railroad) is the domestic shipping point price plus lowest transportation charge to point of export. Maximum price to a domestic consumer on line of the originating railroad plus transportation to point of export applies on No. 1 railroad steel. Customary differentials apply on other railroad and non-railroad grades.

Sheets, Strip

Sheet & Strip Prices, Page 264

Curtailment of production of automobiles and household appliances, including refrigerators and washing machines, will provide some relief in pressure on sheet mills and some of this tonnage may be available for lower priorities, depending on volume of allocations with higher rating. The latter are on the increase, limiting probability of relief for non-defense users.

In the East sheetmakers believe they will be able to fill considerable low priority orders before the end of the year and perhaps some civilian tonnage as well. This depends greatly on the volume of high priority orders filed in the next three months and the dates this material will be required.

Inquiry is being stimulated by activity of warehouses seeking shipments under the recent quota ruling. In other cases demand is off from the midyear level and some cancellations have been received. A manufacturer of electrical equipment with A-10 blanket rating has cancelled all tonnage not definitely scheduled for rolling because of assurance that supply of copper and brass would be inadequate by the time the steel might be delivered.

Sheet output is held down by production of light plates on continuous sheet mills. Tin mill demands also are heavy, reducing capacity available for other sheets. Added plate capacity now under construction will relieve this situation eventually.

Classification of narrow cold-rolled strip orders by mills reveals considerable tonnage due consumers originally designated for defense requirements may fall outside that category, as material that eventually may fill defense needs will move through secondary sellers and partsmakers who find difficulty in ascertaining the ultimate use.

Many rerollers in New England have reduced inventories of hot strip and are pressing hot mills for stock. This situation reaches back to shortage of semifinished steel.

Plates

Plate Prices, Page 264

Virtually all plate tonnage now is going into defense work, principally construction. Estimates of current needs for shipbuilding range from 175,000 to 225,000 tons per month. With new shipways nearing completion and need for ships insistent this figure may be exceeded next year.

Railroad requirements are being given greater consideration and now are perhaps second in point of tonnage allocated, though still far below shipyards.

Plate demand is more pressing than ever, with priorities running high and nondefense consumers standing little chance of obtaining more than occasional small lots. Some additional material may be

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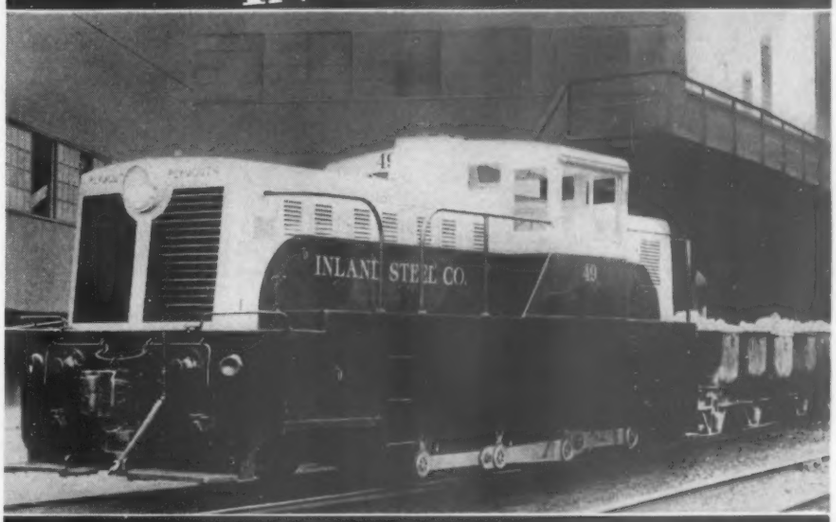

MEASURE LOCOMOTIVE PERFORMANCE BY THE Flexomotive YARDSTICK!

In every industrial yard—steel plant—wherever Flexomotives are at work moving materials quickly, economically and in volume, new comparison standards are being set for industrial locomotive track haulage.

By any practical yardstick, Plymouth Flexomotives *earn* consideration whenever and wherever tonnage, speed and cost requirements call for industrial locomotive power. It will pay you to give them that consideration.

FLEXOMOTIVES ARE FIRST IN—

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20% less fuel; lowest maintenance cost ever recorded for full powered locomotive.

POWER
Outpull any other diesel of equal size and horsepower; Plymouth 45 - ton Flexomotive outpulled a 65-ton steamer on same job.

EFFICIENCY
From 83% to 88% average over entire speed range.

AVAILABILITY
95% to 97% availability in 24 hour service.

FLEXIBILITY
Instant variation of speeds to meet a wide range of work requirements and conditions. Finger-tip control.

RUGGEDNESS
Most ruggedly built internal combustion locomotive in America.

PLYMOUTH LOCOMOTIVE WORKS
Division Of THE FATE-ROOT-HEATH COMPANY,
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Write for This Outstanding Performance Record—factual evidence charting Plymouth Flexomotive performance in more than 35,000 hours of continuous operation is yours for the asking. Write for it!

PLYMOUTH Flexomotive
DOLLAR FOR DOLLAR
THE GREATEST DIESEL LOCOMOTIVE EVER BUILT

supplied to warehouses under the recent quota, but this probably will be small.

In the Birmingham district ship and car needs are heavy and plate deliveries now are at least seven months in the future.

PLATE CONTRACTS PLACED

Unstated, steel water tank with foundations, quartermaster school, Schuykill arsenal, Pennsylvania, to Chicago Bridge & Iron Co., Chicago.

PLATE CONTRACTS PENDING

8000 tons, wind tunnel, Moffet Field, Calif.; expected to be awarded within thirty days to Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.

1600 tons, 58-inch water pipe line, Tacoma, Wash.; Steel Tank & Pipe Co., Portland, Oreg., low for steel plate, $156,612.

Unstated, three welded oil storage tanks for Grand Coulee; bids to Denver, Oct. 16, No. 1565-D.

Bars

Bar Prices, Page 265

Steel bars constitute one of the tightest situations in mill production, second only to plates. While there is definite scarcity in some lines most carbon bar producers are able to make deliveries on A-1-a to A-1-c ratings by December. Orders below these ratings can not be promised before first quarter, although there are occasional exceptions. The situation is somewhat easier because of slower demand the past few weeks. Since jobbers have been advised they can buy as much for fourth quarter as they shipped in first quarter, demand is expected to increase. If they are able to obtain this much material most resellers will be fairly well situated to supply their customers.

Greatest scarcity at present is in small flats, rods and hexagons, material produced on eight-inch mills.

High priority ratings cover fully 90 per cent of heavy forward orders for alloy and carbon steel bars on mill books for fabrication in New England shops. Delivery against steady releases extend through first quarter next year in some instances, notably for government shops at Watertown and Springfield, Mass. Forging plants, shipyards and small tool manufacturers are covered well in advance as a rule. Tonnage available for non-defense requirements without preferential ratings is small. Some hope of relief is held out for this class of consumers through jobbers, who expect some improvement under the quota ruling.

Cold-finished bar delivery in general is two to three weeks further extended than on hot-rolled carbon bars, although some cold finishers can supply tonnage with top ratings before the end of the year. Alloy bar deliveries are far more extended and where special treatment is involved some sellers have little to offer before the latter part of next year.

Pipe

Pipe Prices, Page 265

Steel pipe deliveries are being met fairly well though mills are not able to produce at capacity, due to lack of semifinished steel supply. Relatively less pipe tonnage is under high priority than in most steel products. This has allowed mills to make longer runs and has supplied non-defense tonnage to considerable degree.

Inasmuch as a large portion of tubular goods is distributed by warehouse and the latter now has a priority rating, less tonnage will be shipped by mills to consumers without priority. Oil country demand is strong but without preference rating, hence deliveries are difficult.

Galvanized pipe production is still far from meeting demand, although defense needs are being covered well. Cast iron pipe production is dependent on pig iron supply, which is sufficient to provide for most urgent needs, though not enough for capacity operation in most cases. Defense requirements are substantial but municipal buying has slackened.

CAST PIPE PLACED

300 tons, 20-inch, Class 200, East Marginal Way pipe line, Seattle, to Hugh G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

125 tons, 6-inch, defense project, Bangor, Me., to Warren Pipe Co., Everett, Mass.

The Question of the hour:

How Can We Substitute?

JESSOP SUGGESTS:-

There are two kinds of substitutions you can make which will effectively aid in National Defense: (1) Substitutions to conserve strategic materials, (2) Substitutions to conserve production time. Certain Jessop Steels will help you conserve in both directions:

FOR CONSERVATION OF MATERIALS

SILVER-PLY Stainless-Clad Steel offers great savings in nickel and chromium. The average sheet or plate is made with a 20% stainless steel cladding, therefore SILVER-PLY uses only 1/5 as much stainless alloy as solid stainless.

MOGUL Molybdenum-Tungsten High Speed Steel affords considerable savings in tungsten, as it contains only 1.30 to 1.80% of this strategic element. It performs equally as well as 18-4-1 for most applications, and in many cases results in superior performance.

RAPID FINISHING Semi-High Speed Steel, containing only 3.75 tungsten, gives excellent service on fast finishing cuts where an extremely smooth and accurate surface is required.

FOR CONSERVATION OF PRODUCTION TIME

High Carbon-High Chrome Die Steels. Jessop's "3C", "CNS", and "WINDSOR SPECIAL" die steels are extremely resistant to wear . . . minimizing down-time for regrinding dies and assuring long die life.

TRUFORM Non-Shrinkable Die Steel is an oil hardening die steel which is very easy to heat treat . . . virtually eliminating waste of materials and time due to inexpert hardening.

Composite Die Sections. Because JESSOP Composite Die Sections are rolled to shape, much less machining is required than for straight sections. Dowel and screw holes may be drilled after hardening.

If You Attend the Metal Show: You are cordially invited to visit the Jessop exhibit at Booth No. 13. We will be glad to answer your questions on conservation.

If You Cannot Attend the Show: Write for our special booklet about the show, and which contains other interesting information for users of tool steels and stainless steels.

JESSOP STEEL CO. FINE JESSOP STEELS WASHINGTON, PA.

JESSOP STEEL COMPANY
WASHINGTON • PENNSYLVANIA

CARBON • HIGH SPEED • SPECIAL ALLOY
STAINLESS and COMPOSITE STEELS

CAST PIPE PENDING

1012 tons, 8 to 12-inch, cast iron, steel or cement asbestos pipe for Fort Ord, Calif.; bids Oct. 14.

530 tons, 4 to 12-inch, Class 150, Fresno, Calif.; United States Pipe & Foundry Co., Burlington, N. J., low.

375 tons, 4 to 10-inch, centrifugal, lighter-than-air base, South Weymouth, Mass.

315 tons, 16-inch, cement-lined, bell and spigot, Panama, sch. 5566, to United States Pipe & Foundry Co., Burlington, N. J.; bids Oct. 3, Washington.

275 tons, 6 to 12-inch, housing project, Hartford, Conn.

125 tons, 6, 8 and 10-inch, cement-lined, Panama, sch. 5553, to American Cast Iron Pipe Co., Birmingham; bids Oct. 6, Washington.

Unstated, 6-inch cast iron and wrought iron pipe, King county water district No. 1; bids to Parker & Hill, engineers, Seattle, Oct. 15.

Rails, Cars

Track Material Prices, Page 265

Domestic freight car awards in September totaled 4470 units, compared with 2668 in August. Bookings for the first nine months were 108,372, compared with 39,279 in the corresponding period of 1940. The month's business was featured by 2050 cars for the Missouri Pacific and 1000 for the Reading Co., the latter to be built in the company's shops.

Further comparisons follow:

	1941	1940	1939	1938
Jan.....	15,169	360	3	25
Feb.....	5.508	1,147	2,259	109
March...	8,074	3,104	800	680
April....	14,645	2,077	3,095	15
May.....	18,630	2,010	2,051	6,014
June	32,749	7,475	1,324	1,178
July.....	6,459	5,846	110	0
Aug.....	2,668	7,525	2,814	182
Sept.....	4,470	9,735	23,000	1,750
9 mos....	108,372	39,279	35,456	10,053
Oct.....	.....	12,195	19,634	2,537
Nov.....	.....	8,234	2,650	1,232
Dec.....	.....	7,181	35	2,581
Total ..	.....	66,889	57,775	16,303

Chicago, Milwaukee, St. Paul & Pacific has asked the Interstate Commerce Commission for permission to finance construction in its own shops of 2025 freight cars, including 1000 box, 500 automobile, 500 hopper and 25 caboose cars.

LOCOMOTIVES PENDING

Bureau of Supplies and Accounts, Navy, seven diesel-electric locomotives and spare parts, delivery east and west yards; bids Oct. 21, sch. 8857.

Navy, one diesel-electric locomotive to delivery to Charleston, S. C.; bids asked.

War department, unstated number of 2-8-8-2 type locomotives for the Yunnan Burma Railroad in China; contemplated.

BUSES BOOKED

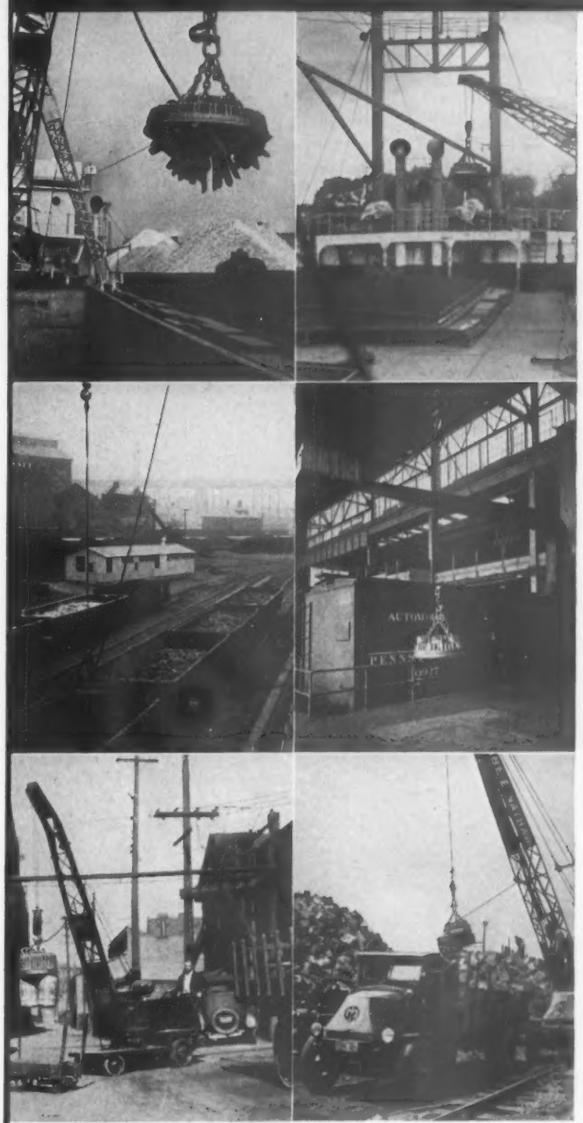
A.c.f. Motors Co., New York: Six 35-passenger for Eastern Massachusetts Street Railway Co.; six 38-passenger for Bee Line Inc., Rockville Center, N. Y.; six 37-passenger for Florida Motor Lines Corp., Jacksonville, Fla.; three 29-passenger for Oahu Railway & Land Co., Honolulu, T. H.; two 37-passenger for Safeway Trails Inc., Washington.

CAR ORDERS PLACED

Boston & Maine, 10 caboose cars, to Pullman-Standard Car Mfg. Co., Chicago.

Navy, one box and three flat cars, to

Quicker Handling
WITH EC&M LIFTING MAGNETS
MEANS QUICKER RELEASE OF—



SHIPS

R. R. CARS

TRUCKS

IN THE INTEREST OF NATIONAL DEFENSE. COMMON CARRIERS SHOULD BE RELEASED QUICKLY

YOU can handle scrap, castings, and finished products . . . any magnetic material . . . *economically* with EC&M Lifting Magnets.

They work 24 hours a day, when required . . . maintain their high lifting capacity continuously . . . make big savings in material-handling costs.

Many companies are now replacing old magnets with EC&M *new type* magnets and handling 25% to 55% more material in the same time. Ask for Bulletin 900.

THE ELECTRIC CONTROLLER & MFG. CO.
2700 E. 79th Street Cleveland, Ohio

MOTOR CONTROLS • BRAKES • LIMIT STOPS • MAGNETS

Haffner-Thrall Car Co., Chicago.

CAR ORDERS PENDING

Chicago, Milwaukee, St. Paul & Pacific, 2025 freight cars, permission sought of Interstate Commerce Commission to finance construction in the railroad's own shops; includes 1000 box, 500 automobile, 500 hopper and 25 caboose cars.

Wire

Wire Prices, Page 265

Merchant wire users may be affected adversely by the warehouse quota plan announced by OPM, as in many instances shipments during first quarter, 1940, on which the quotas were based, were less than the current movement. The seasonal factor seems not to have been taken into account.

Jobbers of wire products are in better position as first quarter usually is devoted to building up stocks for the spring and summer demand for agricultural and building trades use.

Barbed wire is extremely tight as a result of large OPM allocations for export to Great Britain, on which delivery dates recently were moved up a month, tying up most barbed wire capacity until the order is completed, with expectation of further allocations.

Chief bottleneck continues in wire rods, heavy tonnage being sent to Great Britain. High preference ratings on manufacturers' wire items, requiring more than normal output of drawbenches, prevents production of merchant wire, on which preference is difficult to obtain.

Structural Shapes

Structural Shape Prices, Page 265

Structural steel delivery is slow and, as a result of inability to obtain place on mill books with promise of delivery, demand is declining. Fabricators are well behind schedule because of delay in delivery of plain material. Numerous projects, especially those without high priority, have been stalled in the course of construction. An instance has occurred of a powerhouse with A-2 rating being completed except for steel for fuel bunkers, which has been long delayed.

SHAPE CONTRACTS PLACED

5000 tons, hangar and facilities, first of structural steel contracts, lighter-than-air base, South Weymouth, Mass., to Harris Structural Steel Co., New York; Sawyer Construction Co., and V. Barletta Co., Boston, joint contractors.

2200 tons, airplane engine supercharger plant, Allis-Chalmers Mfg. Co., Milwaukee, for Defense Plant Corp., to Worden-Allen Co., Milwaukee; bids Sept. 12.

2100 tons, steam plant for water and power department, Los Angeles, to Bethlehem Steel Co., Los Angeles.

2000 tons, plant buildings, Phelps-Dodge Corp., Los Angeles, to Bethlehem Steel Co., Bethlehem, Pa.

2000 tons, or more, transmission towers, Bonneville-Vancouver line No. 6; to American Bridge Co., Pittsburgh, at $293,249.

1700 tons, Nightingale Hospital, New York, to Harris Structural Steel Co., New York.

1650 tons, ordnance machine shop, navy yard, Mare Island, Calif., to Columbia Steel Co., San Francisco.

1050 tons, airplane hangars, Pan-American Airways, for export, to Fort Pitt Bridge Works, Pittsburgh.

988 tons, bridge across Los Angeles river and Southern Pacific Co. and Los Angeles Railway tracks, Los Angeles, to Bethlehem Steel Co., Los Angeles.

500 tons, warehouse, ordnance machine shop and other buildings, arsenal, Benicia, Calif., to Golden Gate Iron Works, San Francisco.

475 tons, marine runway, Philadelphia, to Fort Pitt Bridge Works, Pittsburgh, through Drydock Associates.

470 tons, building, Linde Air Products Co., New York, to Fort Pitt Bridge Works, Pittsburgh.

410 tons, manufacturing building, National Can Co., Aliquippa, Pa., to American Bridge Co., Pittsburgh.

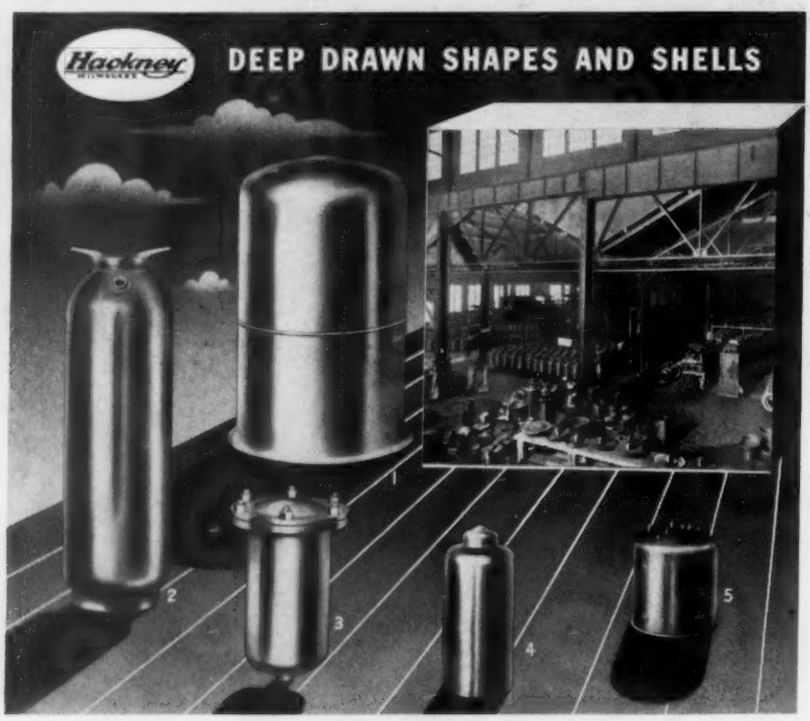
350 tons, three storehouses, Navy yard, Portsmouth, N. H., to Lehigh Structural Steel Co., Allentown, Pa.; Aberthaw Construction Co., Boston, contractor.

300 tons, army hangar, Yakutat, Alaska, to Pittsburgh Bridge & Iron Co., Pitts-

SHAPE AWARDS COMPARED

	Tons
Week ended Oct. 11	23,150
Week ended Oct. 4	14,786
Week ended Sept. 27	62,861
This week, 1940	36,034
Weekly average, 1941	28,471
Weekly average, 1940	21,326
Weekly average, Sept., 1941	31,253
Total to date, 1940	1,090,061
Total to date, 1941	1,195,796

Includes awards of 100 tons or more.



CAN A HACKNEY SPECIAL SHAPE SOLVE YOUR PROBLEM, TOO?

A Hackney deep drawn shell has aided manufacturers in scores of industries to solve their problems—effectively and economically.

Through the use of Hackney design and manufacturing facilities many concerns have been able to speed up production. Often they have reduced the cost of an individual part. Overall weight, too, is frequently lowered through the use of a Hackney part. At other times strength is increased. Many times manufacturers realize a combination of these and many other important advantages.

Pressed Steel Tank Company specializes in the manufacture of seamless deep drawn shells of various sizes. By means of high pressure hydraulic presses, especially designed for the purpose, the shell is drawn from a solid circular sheet or plate of ferrous or non-ferrous metals. A smooth finish, uniform thickness and temper are assured by Hackney's Special Cold Drawing Process.

Why not consult a Hackney engineer regarding the use of seamless drawn tubes, shells, special cylindrical shapes or pressure tanks. They may represent an improvement for your product. Write for full information today.

1. Gas-fired boiler tank 29" diameter, 46⅛" high. 2. Fire extinguisher tank 16" diameter, 51" high. 3. High pressure grease dispensing tank 10" diameter, 20" high. 4. Case for oil submerged circuit breaker 11" diameter, 26" high. 5. Small compressor tank 14" diameter, 16" high.

PRESSED STEEL TANK COMPANY

1387 Vanderbilt Concourse Bldg., New York • 208 S. LaSalle St., Room 1511, Chicago
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Hackney MILWAUKEE

burgh, at $35,471.

295 tons, bridge in Alaska, for Alaska road commission, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

260 tons, erecting and paint shop, Whitcomb Locomotive Co., Rochelle, Ill., to Wendnagel & Co., Chicago, on revised bids Oct. 2.

255 tons, construction trestle towers and girder supports, Etowah, Tenn., for Tennessee Valley Authority, to American Bridge Co., Pittsburgh.

250 tons, boiler house, ordnance works, St. Louis, for government, to American Bridge Co., Pittsburgh.

230 tons, plant, E. I. du Pont de Nemours & Co., Wyandotte, Mich., to Ernst Iron Works Inc., Buffalo.

200 tons, addition, Hanna Furnace Corp., Buffalo, to Lackawanna Steel Construction Co., Buffalo.

162 tons, truss span, Illinois Central railroad, Roxie, Miss., to American Bridge Co., Pittsburgh.

105 tons, state highway bridge, Carbon county, Pennsylvania, to Pine Brook Iron Works, Scranton, Pa.

100 tons, addition, engine house stalls 12 and 20, Union Pacific Co., Ogden, Utah., to unnamed interest.

100 tons, building, Wilhelm Paint Co., Reading, Pa., to Reading Steel Products Co., Reading.

Unstated, 40 structural steel trestles, assembled and painted flood wall gate openings, section 3 (Guyandot), U. S. Engineer, Huntington, W. Va., to the Allentown Boiler Works, Allentown, Pa., inv. 516, bids Oct. 16.

SHAPE CONTRACTS PENDING

2054 tons, including 1783 tons fabricated structural steel; 225 tons silicon structural steel; 28 tons, steel castings, and 18 tons, steel forgings, superstructure, Pennsylvania railroad bridge, Tuscarawas river, local protection project, Massillon, O.; bids to United States Engineer, Huntington, W. Va.

2000 tons, highway bridge, Fayette, Ky., bids Oct. 10.

1550 tons, tank arsenal extension, Chrysler Corp., Center Line, Mich.

875 tons, punched plates and shapes, Wooldridge Co., Sunnyvale, Calif.

720 tons, grade separation, Cuyahoga county, Ohio, for state.

600 tons, ventilating building, Lincoln Tunnel, New York; James J. Waters Corp., low.

426 tons, alterations to Balboa bridge, Canal Zone, including conversion of present truss span to movable unit supported on barge, including 77 tons machinery, spec. 5540.

410 tons, railroad bridge PSC-6630, for New York state.

400 tons, high school for seniors, Lackawanna, N. Y.

400 tons, drum gate, Friant dam, Central Valley project, California; Columbia Steel Co., San Francisco, low.

387 tons, bridges, Lancaster county, Pennsylvania; bids to State Highway Department, Harrisburg, Pa., Oct. 17.

375 tons, girder spans, Ullin, Ill., for Illinois Central railroad.

350 tons, shop building, Langley Field, Va.

345 tons, extension to transportation building, Bremerton, Wash., for Navy.

270 tons, railway bridge RC-41-43, Southfield, N. Y., for state.

195 tons, state bridge over Miami river, Shelby county, Ohio.

180 tons, various buildings, DeLaval Separator Co., Trenton, N. J.

170 tons, garage, Western Electric Co., Kearny, N. J.

146 tons, addition, plate shop, Richmond Shipbuilding Corp., Richmond, Calif.;

FASTER *More Efficient* LIFTING

- Release Men for Other Work
- Increase Plant Capacity

with

CURTIS AIR HOISTS

A tough problem — Insistent pressure for increased output in the face of a shortage of skilled labor. The solution — Install a CURTIS One-man Air-Power Hoist and release some men for other jobs and at the same time make the lifting job faster and easier; also more efficient by reducing man fatigue.

Illustrated above is a large automobile manufacturing plant that uses CURTIS Air Hoists to lift and place motors on testing blocks. This continuous heavy duty job is now a fast, easy, one-man operation.

CURTIS All Steel Air Hoists are smooth in action, speedy, and efficient. They provide extreme accuracy of control and will handle the most delicate hoisting operations. Any workman can operate them — the hoist does all the work by air power. Dead weight is extremely low, allowing light supports as well as easier moving of trolley mounted loaded hoists. Available in pendant, bracketed and rope compounded types. Cannot be damaged by overloading and are unharmed by steam, fume or dust-laden atmospheres.

For complete information as to how you can step up production and lower costs in your plant, send for free booklet "How Air is Being Used in Your Industry" — mail coupon today.

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Please send me your free booklet "How Air is Being Used in Your Industry" and further details concerning Curtis Air Hoists.

Name.....

Firm.....

Address.....

City.....State.....

Judson-Pacific Corp., San Francisco, low.

100 tons or more, addition, naval prison, Portsmouth, N. H.; bids Oct. 16, spec. 10506, Public Works Officer.

Tin Plate

Tin Plate Prices, Page 264

Renewed army buying has increased volume of business on tin mill order books. This has covered two types of foodstuffs, one for field use and the other for army kitchens.

It is notable that the new field rations are to be contained in standard key-opening cans. This proved a difficult problem during the last war, since the cans were designed for carrying purposes rather than for manufacturing abilities. As a result, canmakers were unable to produce cans in large volume. The present ration cans have been designed to suit can-making machinery. New orders involve about 100,000,000 cans, following experimental buying for about a year.

Following announcement of a new plant at Darby, Pa., National Can Co. is taking bids for an additional unit at Aliquippa, Pa., the home of Jones & Laughlin Steel Corp. tin mill, which will supply plate for the can company under the agreement made when Jones & Laughlin bought the McKeesport tin plate division of National Can Co. last year.

Reinforcing Bars

Reinforcing Bar Prices, Page 265

Delayed deliveries on reinforcing steel contracts placed weeks ago make mills reluctant to accept further tonnage under the uncertainties of delivery. Allocations are being made for projects most needed for defense expansions and this procedure is increasing.

As a result, many projects are being abandoned until there is some certainty of receiving steel. The volume of this potential tonnage is mounting. Some highway and bridge work is being given A-7 priority in the East but this low rating is causing estimates to be withheld.

REINFORCING STEEL AWARDS

2100 tons, buildings and facilities, North Texas Quartermaster Depot, Ft. Worth, Tex., to North Texas Steel Co., Ft. Worth; Harry B. Friedman, contractor-engineer, Fort Worth.

1000 tons, harbor fortifications, Boston; 500 tons to Bethlehem Steel Co., Bethlehem, Pa., and 500 tons to Jones & Laughlin Steel Corp., Pittsburgh, through United States Engineers.

500 tons, additional requirements, ordnance plant, Kingsbury, Ind., to Bethlehem Steel Co., Bethlehem, Pa.; Bates & Rogers, contractor.

450 tons, substructure, aircraft engine building, Ford Motor Co., Dearborn, Mich., to Concrete Steel Co., Detroit.

400 tons, buildings 30 and 31, navy yard, South Boston, Mass., to Truscon Steel Co., Youngstown, O., through Morton C. Tuttle Co., Boston.

380 tons, Solomon Creek pumping station, Wilkes Barre, Pa., to Bethlehem Steel Co., Bethlehem, Pa.; Sordoni Construction Co., contractor.

350 tons, service and parts building, Pontiac Motor Division, General Motors Corp., Pontiac, Mich., to Truscon Steel Co., Youngstown, O.; O. W. Burke, contractor.

320 tons, Toby Creek intercepting sewer, Kingston, Pa., to Bethlehem Steel Co., Bethlehem, Pa.; Thomas Proctor Co., contractor.

300 tons, Ft. Richardson, Alaska, army air base, to Seattle Steel Co., Seattle.

300 tons, small arms plant, Lyon Inc., Detroit, to Joseph T. Ryerson & Son Inc., Detroit.

300 tons, plant, General Electric Co., Everett, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; Raymond Concrete Pile Co., New York, contractor.

300 tons, office building, American Can Co., Newark, N. J., to Bethlehem Steel Co., Bethlehem, Pa.; Turner Construction Co., contractor.

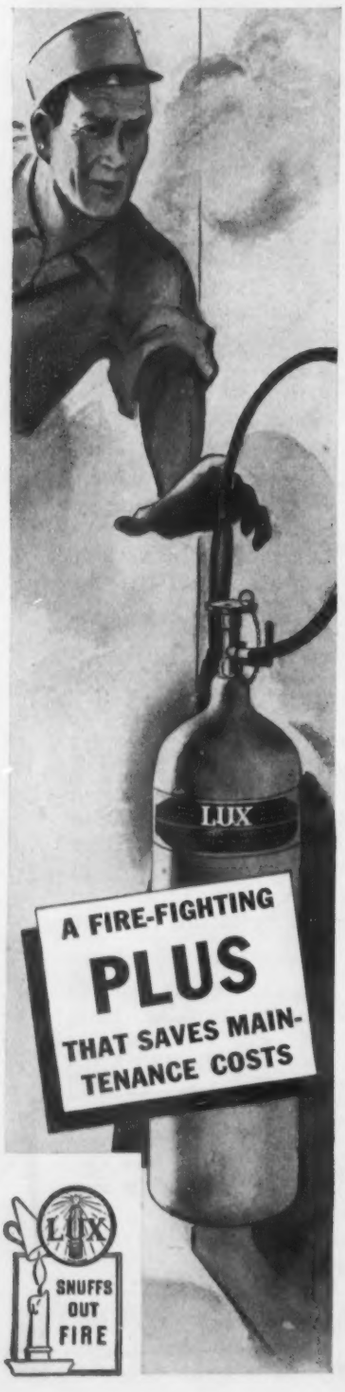
170 tons, state highway project RC-41-39, Essex-Clinton counties, New York, to Truscon Steel Co., Youngstown, O.; Collins Bros., Mechanicsville, N. Y., contractor.

160 tons, Quartermaster Depot laboratory, Navy yard, Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.;

CONCRETE BARS COMPARED

	Tons
Week ended Oct. 11	7,720
Week ended Oct. 4	14,051
Week ended Sept. 27	49,269
This week, 1940	5,705
Weekly average, 1941	14,366
Weekly average, 1940	8,814
Weekly average, Sept., 1941	34,025
Total to date, 1940	389,838
Total to date, 1941	603,390

Includes awards of 100 tons or more.



ALWAYS READY FOR ACTION!

. . . this extinguisher needs no annual recharging

NEXT time you buy extinguishers think twice about maintenance. Many extinguishers require emptying, refilling every twelve months. This costly procedure can't be skipped without running risks in emergencies.

All you need do with LUX extinguishers is *weigh them annually*. LUX carbon dioxide does not deteriorate in the extinguisher, won't corrode parts, or threaten LUX's quick effectiveness when fire breaks out. Weighing tells immediately if any LUX gas has been removed. Most LUX users report that their extinguishers *have never required extra servicing.*

This is another *plus* value in fire fighting brought to you by LUX. You profit from *lower maintenance costs, assured operation* in emergencies.

Here are the PLUS values in fire-fighting

1 LUX carbon dioxide gas is one of the fastest known extinguishing agents.

2 LUX extinguishers are effective on both electrical and flammable liquid fires.

3 LUX gas is clean, non-damaging, non-contaminating, non-toxic.

4 *45,000% expansion* drives LUX gas throughout fire area, despite obstructions.

5 Annual recharging is not necessary with LUX. Simply weigh periodically.

6 LUX service depots are maintained in principal cities.

Walter Kidde & Company
Incorporated
1032 West Street, Bloomfield, N. J.

Turner Construction Co., contractor.

140 tons, drum storage building, Gulf Oil Corp., Staten Island, N. Y., to Jones & Laughlin Steel Corp., Pittsburgh; Wortman Construction Co., New York, contractor.

130 tons, Annette Island, Alaska, army air base, to Bethlehem Steel Co., Seattle.

120 tons, buildings, Picatinny arsenal, Dover, N. J., to Bethlehem Steel Co., Bethlehem, Pa.; F. Briscoe Co., contractor.

100 tons, plant, Westinghouse Electric & Mfg. Co., Sharon, Pa., to Dambach Inc.

100 tons, RCA research laboratory, Princeton, N. J., to Bethlehem Steel Co., Bethlehem, Pa.; H. K. Ferguson & Co., contractor.

100 tons, Army Signal Corps facilities, Ft. Monmouth, N. J., to Ceco Steel Products Corp., New York; Ehret-Day Co., contractor.

REINFORCING STEEL PENDING

2595 tons, Coachella canal, Boulder Canyon project, Boulder City, Nev., specification 995; bids on general contract Oct. 27, including placing only of bars.

2000 tons, Southwark station, Philadelphia Electric Co., Philadelphia.

1000 tons, two batteries, Ft. Tilden, N. Y.; Johnston, Drake & Piper, low.

1000 tons, 1000-foot pier and transit shed for army base, Seattle, Wash.; General Construction Co., Seattle, low at $1,944,000. (Note—Pier B for Port of Embarkation).

970 tons, South filtered water reservoir, McMillan plant, Washington; bids Oct. 24 to United States Engineer office, Washington, serial 68.

800 tons, transformer plant, Westinghouse Electric & Mfg. Co., Sharon, Pa.

800 tons, east power house, Grand Coulee dam, Wash.; bids soon.

575 tons, Friant-Kern canal, Central Valley project, California, specification 1000; bids Oct. 29.

500 tons, Arkansas ordnance plant, Req. E-234, Jacksonville, Ark.; Ford, Bacon & Davis, contractors.

400 tons, plant, Bell Aircraft Corp., Niagara Falls, N. Y.; Austin Co., Cleveland, contractor.

350 tons, for Ampere substation, bids to Bonneville project, Portland, Oreg., Oct. 15, No. 2292.

350 tons, purchasing officer, Department of Interior, Bonneville Power administration, inv. 2292; bids Oct. 15, Portland, Oreg.

261 tons, St. Luke's School of Nursing, Chicago; bids Oct. 7.

240 tons, canal work on Roza division, Yakima project, Washington, specification 997; bids Oct. 23.

200 tons, factory, Hoffman-La Roche Inc., Nutley, N. J.; White Construction Co., contractor.

200 tons, including bands, mesh, etc., concrete 58-inch water pipe line, at Tacoma, Wash.; American Concrete Steel Pipe Co., Tacoma, low at $195,479 for concrete.

180 tons, including 169 tons bars and 11 tons wire mesh (alternate 184 tons, including 102 tons bars and 82 wire mesh), housing project, Rockford, Ill.; Paul Steenberg Construction Co., St. Paul, low; bids Oct. 6.

160 tons, dam, Carbondale, Ill., for Department of Agriculture; Truscon Steel Co., Youngstown, O., low; bids Sept. 19.

160 tons, bridges, Lancaster county, Pennsylvania; bids to State Highway Department, Harrisburg, Pa., Oct. 17.

140 tons, addition, Shuster Stores, Milwaukee.

139 tons, bridge, Clark Fork river over

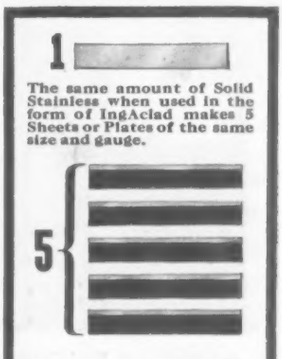
Here's a CHEERFUL NOTE!

These days when fabricators and processors face so many difficult equipment and production problems, it's refreshing to discover the serviceability and economies which IngAclad offers.

It's a cheerful note you will not forget even when the emergency is over, because you will always like the service it gives and welcome the savings it makes. You will find, as have so many others, that in many types of equipment IngAclad Stainless-Clad Steel . . .

—serves equally as well as the solid metal, and
—makes Stainless go 5 times as far
—fabricates much more easily than solid stainless sheets and plates of similar gauge
—gives perfect stainless service on the side that is used
—costs much less, and
—enables you to use Stainless much more widely

Flick Centrifugal Entrainment Separator installed in Armour & Company Soap Works, Chicago. Outer shell, intake and outlet pipes are of IngAclad. Designed and built by Wurster and Sanger, Consulting Chemical Engineers, Chicago, Illinois.



Write for special IngAclad Folder

Let us show you how this remarkable achievement in Steel by the Ingersoll Patented Ingot Process is cutting costs for many. Remember, too, that only IngAclad Stainless-Clad Steel has a proven 10-year record in successful use. Fabricators are invited to write for the IngAclad Welding Manual.

Users of INGACLAD include:

American Cyanamid Co.
R. D. Cole Mfg. Co., Newnan, Ga.
Dow Chemical Co.
E. I. DuPont de Nemours Co.
Greenville Steel & Foundry Co., Greenville, So. Car.
Holliston Mills, Kingsport, Tenn.
Leader Iron Works, Decatur, Ill.
Monsanto Chemical Co.
Sayles Finishing Plants, Inc.
Sheet Metal Engineering Co., Chicago.
Southern Bleachery & Print Works, Taylors, So. Car.
Stevens Metal Products Co., Niles, Ohio.

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BORG-WARNER CORPORATION
310 South Michigan Ave.
Chicago, Illinois

Plants: Chicago, Ill.; New Castle, Ind.; Kalamazoo, Mich.

Unretouched photo of machine-cutting. Note the inseparable bond formed between the mild steel and the cladding of stainless steel.

IT WILL PAY YOU TO INVESTIGATE THE ECONOMIES OF
INGACLAD
STAINLESS-CLAD STEEL
"A BORG-WARNER PRODUCT"

Northern Pacific Co. tracks, Mineral county, Montana, for state; bids Oct. 22.

115 tons, 21 culverts, R-2202, Vigo county, Indiana, for state highway commission; Putnam & Green, Ft. Wayne, Ind., low; bids Oct. 7.

100 tons, sewage treatment plant, Great Lakes Naval Station, Ill.

Unstated, state concrete bridge, Idaho; G. D. Lyon, Spokane, Wash., low, $190,-248.

Unstated, bureau of roads project, Coeur d'Alene forest, Idaho; Elliott & Co., Seattle, low, $175,588.

Unstated, bureau of roads, 786-foot bridge, Clark Fork river, Mineral county, Montana; bids at Missoula, Oct. 22.

Unstated, Montana state road project including bridges; D. M. Manning, Hysham, low, $62,575.

Pig Iron

Pig Iron Prices, Page 266

Pig iron distribution is proceeding in more orderly fashion as experience of the past two months with mandatory deliveries shows the way. This is reflected in requests for November shipments now being filed with producers. Wider distribution among smaller consumers is resulting from liquidation of the larger inventories, which has been forced under allocations to date. Some small foundries are able to obtain sufficient iron to maintain operations without defense ratings. As the large inventories disappear, however, more tonnage must be allocated to larger melters and will tend to restrict shipments to those without priorities.

The tendency now is to allocate supplies on the basis of needs rather than on strict priority, which eases the situation. Cross-haul deliveries are being reduced and further improvement in this respect is indicated for November. Melt is large in the aggregate, exceeding current deliveries, due to melters dipping into reserves where inventories are considered excessive.

Foundries pressed for material find scrap shortage more acute than in pig iron and ratio of the two is being altered to fit the supply available. Foundries with no defense work continue to seek such contracts in order to obtain priority ratings.

Machine tool builders are being supplied sufficient pig iron promptly to maintain their production.

Scrap

Scrap Prices, Page 268

Full priority regulation of the scrap market, effective Oct. 11, was imposed last week under general priorities order M-24, by Donald M. Nelson, director of priorities. The order authorizes the director of priorities to issue specific directions for delivery of scrap and provides for monthly reports for the preceding month, beginning Nov. 15, covering inventory, production, sales and consumption. These reports are to be made by producers, dealers, brokers and consumers.

It is planned that on the basis of these reports a general policy for the distribution of scrap under mandatory orders will be developed. Details of the plan will be found on page 79.

Shortage of scrap continues a major factor in steel production and this order is designed to achieve better distribution and forestall further reductions in steel output for the present, though it will not increase the overall supply. Various means are being resorted to in the effort to bring out larger tonnages, with some result. Complaint is general of the poor quality of much of the scrap offered.

Cast grades are in limited supply and melters are using every

KRANE KAR SWING BOOM TRACTOR CRANE

Handling 5-ton Steel Forgings at Plant of Bethlehem Steel Co., Sparrows Point, Md.

3 SIZES:
2½, 5, & 10 Ton Capacities
11 to 31 Ft. Booms
Solid Cushion or Pneumatic Tires

8 Points for Defense

1 VISION is unobstructed
2 BOOM TOPPING with full load
3 STABILITY without stabilizers
4 TRACTION INCREASED with load
5 AUTOMATIC BRAKES
6 EASY STEERING with load
7 SIMPLICITY of control
8 SAFETY under all conditions

Among the Users: Bethlehem Steel, Carnegie-Illinois Steel, American Steel & Wire, Keystone Steel & Wire, Otis Elevator, Wm. Sellers & Co., General Motors, Frost Gear and Forge, etc.

Write for Bulletin No. 55, with illustrations and specifications

SILENT HOIST & WINCH & CRANE CO.
849 63rd ST., BROOKLYN, N.Y.

Tool Steel Scrap

Cents per pound, to consumers f.o.b. shipping point

Tungsten types

For each 1% tungsten contained
Solid scrap containing over 12%...1.80c
Solid scrap containing 5 to 12%....1.60
Turnings, millings containing over 12% 1.40
Turnings, millings, solids under 5% .1.25

Molybdenum Types

Solid scrap, not less than 7% molybdenum, 0.50 vanadium.....12.50
Turnings, millings, same basis...10.50
Solid scrap, not less than 3% molybdenum, 4% tungsten, 0.50 vanadium 13.50
Turnings, millings, same basis.....11.50

means to obtain supplies. Direct dealing between producer and consumer is on the increase and offerings by railroads are far below usual size.

Leon Henderson, price administrator, last week announced his office is not considering revision of scrap prices upward or change in classification so that higher prices would be allowed on some grades. This will tend to release any tonnage that might be held back in hope of better prices.

Institute of Scrap Iron and Steel Inc. has issued a letter to members asking full co-operation in the effort to supply mills with scrap, to avoid dislocation of industry and consequent idleness. The letter stated that consumption this year is 1,000,000 tons per month larger than in the past and efforts must be intensified to provide this excess.

Slight results have followed announcement of higher prices to move remote scrap but in the main its effects have been negligible in face of present demand.

Instances are known where large mills have sufficient supply for only three weeks to a month, with small receipts. Increase in proportion of pig iron in open hearth charges has been resorted to in many cases, thus further depleting the supply of the latter.

Warehouse

Warehouse Prices, Page 267

Downward movement in steel warehouse volume tends to level off, with replacements somewhat better. In the experience of several important suppliers September showed little decline from August, checking the rapid shrinkage of previous months. October business is well sustained.

Distributors in general are well satisfied with quotas recently announced and see further business improvement if mills can go a reasonable distance in filling quotas. Most concern is expressed over plate and bar supply.

Demand for steel from warehouse is strong but sales are limited by unbalanced inventory. Replacement under the quota system is likely to be spotty and while theoretical supply based on first quarter sales is high on heavy hot-rolled products, including plates and bars, taking high priority, the warehouse priority of A-9 is not likely to produce sufficient supply.

Instances have developed of premium prices being paid for needed items, particularly galvanized sheets, and freezing of resale prices is expected.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 265

Bolt and nut makers generally are operating at a good rate, but could be at capacity were steel available. These manufacturers now have relatively little stock on which to draw and such as they have are considerably unbalanced as to sizes, it is said. Nevertheless, some report shipments of plain steel are a little freer than a few weeks ago and as a means for further facilitating shipments at least several in the east have applied for individual ratings of A-10 and have been successful in obtaining them.

Bolt and nut makers are confining the great percentage of their bookings to work carrving as high a preference as possible.

Pacific Coast

San Francisco—Defense projects continue to predominate, while private projects are suffering from priority ratings. The most active market during the week was that for structural shapes and 5685 tons were booked, bringing the aggregate for the year to 528,824 tons, compared with 290,817 tons for the corresponding period in 1940. Bethlehem Steel Co. took 2100 tons for a steam power plant for Los Angeles and 988 tons for a bridge over the Los Angeles river and the Southern Pacific Co. and Los Angeles Railway Co. tracks, Los Angeles.

No plate awards of size were reported. To date this year 551,475 tons have been placed, compared with 165,629 tons for the same period a year ago. It is expected that Pittsburgh-Des Moines Steel Co. will be awarded, within thirty days, a contract for a wind tunnel at Mof-

That's Diamond "G" Delivery Service! . . .

And what does this mean? Just this, when you order Diamond G Lockwashers your order—large or small—is shipped the same day you specify . . . or else we notify you by wire.

But service isn't all you get with Diamond G Lockwashers—you get the best qualities possible for us to put in a lock washer. Uniform, fine, high grade steel . . . controlled accuracy in rolling . . . production and scientific tempering that assures you of maintained uniform tension at all times . . . and at the right prices.

If you want quality and quick deliveries on all types of lock washers—including stainless steel and phosphor-bronze—get in touch with George K. Garrett Co., 1421 Chestnut St., Philadelphia, manufacturers of . . .

NON-TANGLING

DIAMOND "G" LOCKWASHERS

Toughy Dan, the lock washer man, says "Fill in this blank and get your free metal shop rule for measuring lock washers, bolts, etc."

GEO. K. GARRETT CO., Dept. S
1421 Chestnut St., Philadelphia
Please send me my FREE rule.

NAME .....

FIRM .....

ADDRESS .....

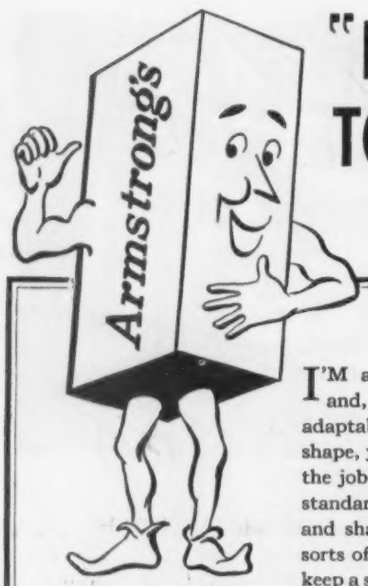
fett Field, Calif., involving 8000 tons of plates.

Demand for cast iron pipe continues unabated and awards aggregated 3293 tons, bringing the total for the year to 47,056 tons, compared with 34,080 tons for the corresponding period in 1940.

Reinforcing bar mills on the Pacific Coast find they can not handle the business of former clients, due to priority claims for national defense work. Awards totaled 3364 tons, bringing the aggregate for the year to 146,328 tons, compared with 135,050 tons for the same period last year.

Seattle—Large awards for national defense feature the situation. R.F.C. has allocated $7,000,000 for an aluminum plant at Spokane, Wash., and Alcoa officials have been authorized to prepare plans, work to start as soon as the site has been selected. Capacity will be 30,000 tons a year, Alunite from Alabama may be used and Union Carbide Co. may be selected as operator.

Bids were opened Oct. 6 at Portland for construction of the main plant of the Electro-Metallurgical Co. at St. Johns to produce ferro-alloys. Parker-Schram Co. has completed preliminary work. Plant will be 280 x 178 feet, bids to F. L. Bolling, St. Johns, resident engineer.



"I CAN BE SHAPED TO FIT IN ALMOST ANYWHERE!"

I'M an Armstrong's Insulating Fire Brick, and, among other things, that means I'm adaptable. Yes sir, if you want me in a special shape, you can change me in a jiffy . . . right on the job! You can get me in special shapes or in standard sizes which may be notched, grooved, and shaped with a saw or rasp to fit into all sorts of places. That means you'll only need to keep a small supply of standard sizes and shapes in stock for repair and replacement purposes.

And my adaptability doesn't stop here, either. You see, Armstrong's Brick come in five classes for temperatures up to 2600° F. They meet your essential requirements for efficient service—low thermal conductivity, high physical strength, uniformity in size and composition, low shrinkage, and ample refractoriness for the use intended!

If you want to simplify furnace design and construction, cut fuel costs, speed production, and insure more accurate temperature control, follow the examples of leading furnace manufacturers and operators throughout the country—give *your* heat-treating equipment the lasting protection of dependable Armstrong's Insulating Fire Brick!

" . . . AND BE SURE TO GET THESE FREE BOOKLETS"

Two new booklets are available, full of well organized, helpful information. "Armstrong's Insulating Fire Brick" gives you all the facts about the five classes of Armstrong's Brick. "Armstrong's Cements for Laying and Facing . . . " points out the importance of selecting the proper refractory cements and describes Armstrong's full line. Get both books now, without obligation. Write to Armstrong Cork Co., Building Materials Div., 985 Concord St., Lancaster, Pa.

Armstrong's

HIGH TEMPERATURE INSULATION

Visit our exhibit at the National Metal Exposition

Two important equipment contracts for Coulee power house have been placed by bureau of reclamation. General Electric will furnish six 36,000-kva. transformers, low at $503,960, and three transformers will be furnished by Allis-Chalmers Mfg. Co., Milwaukee, low at $151,200. Bids will be called soon by U. S. engineer for proposed $3,790,000 air base on Whidby Island, Puget Sound, involving hangars, ramps, piers, etc.

While local rolling mills have moderate inventories of scrap, the present system of federal regulation is sending material east instead of to the Pacifice Coast. For this reason Montana has been removed from local territory. Raising of price ceilings in other states than on the Pacific has placed this section under a decided handicap, scrap dealers assert. To illustrate, $16.50 is the ceiling for rails here and considerable of this material has been shipped to Kansas City, paying a freight of $14.60. Further price adjustments will be necessary, it is stated, to provide sufficient materials for the industry to operate effectively on the Pacific. Unless receipts increase steel mills will shortly be faced with shortage of materials.

Mills are running at capacity, backlogs showing no decline. Armv projects in Alaska have placed 430 tons of reinforcing bars with local suppliers.

Canada

Toronto, Ont.—Demand for iron and steel is gaining rapidly and government representatives seek to increase deliveries from the United States to meet the more pressing war needs. While good progress is reported in connection with Canada's shipbuilding program, operations have been retarded through difficulty in obtaining plates from the States, and some other branches of Canadian industry also have been slowed down, due to slow deliveries. Plate production in Canada is being stepped up and an additional 15,000 tons will be available by the end of the year through increased output by the Steel Co. of Canada Ltd., at Hamilton, Ont. Next year Dominion Steel & Coal Corp., will be producing plates at its Sydney, N. S., works. All plate production in Canada is under strict priority control and supplies are being given to users engaged on war contracts. During the past month or six weeks there was severe shortage of bolts in Canada due to labor troubles on the Pacific coast.

Orders for sheets are heavy and the government has placed further restrictions on civilian manufacturers. Canadian mills are fully booked and report backlogs running well into next year.

While there was some tapering in structural steel lettings during the past week, prospective demand continues heavy. Awards totaled only about 6000 tons, while orders pending run close to 18,000 tons.

Persistently expanding demand

for merchant bars features the market and several producers accepting only orders that have the approval of the steel controller, and delivery dates are uncertain. Mills are fully booked on all merchant bar production to the end of the year and have large contracts into 1942.

With demand for merchant pig iron considerably in excess of supply, blast furnace operators have increased production of foundry and malleable grades and it is expected that further increase in output will be put into effect almost immediately. Producers have been turning out barely sufficient iron to meet war needs of merchant melters.

Demand for iron and steel scrap is steadily pushing farther ahead of supply and national salvage office has sent out an appeal to mines, quarries, railways, construction companies and all industries using ferrous metal equipment, asking them to release broken or obsolete machinery and tools for scrap. Offerings of steel grades are fairly steady, but only limited tonnages of iron appear and there is a decided shortage of cast scrap and stove plate for foundry use.

Steel in Europe

Foreign Steel Prices, Page 267

London—(*By Cable*)—Increasing volume of war contracts is stimulating production of steel and iron in Great Britain. Necessity for relying increasingly on home output to reduce demand for American steel will gradually absorb all production capacity. Reserves of foundry pig iron and semifinished steel are available and ore and coke supplies are adequate. Demand for shipbuilding, boiler and tank material and alloy steels continues at a maximum. Demand for light sections, sheets and galvanized sheets is increasing. Heavy structurals are quiet. Domestic demand for tin plate is fair.

Ferroalloys

Ferroalloy Prices, Page 266

Leading ferroalloys are moving as rapidly as production permits, still limited by the power situation, which reflects continued dry weather.

This is always a factor in the South during the summer and this year the usual drought has continued longer than usual.

Prices generally are unchanged at levels announced for fourth quarter about a month ago, at which time chrome alloys were advanced. Ferromanganese is being quoted at $120, duty paid, by all sellers except the Rockdale, Tenn., producer, who a few months ago received the approval of Washington to quote $145, furnace.

The $120 price, in fact, has been in effect since July, 1940, and in view of increased cost of labor, coke and ore since that time, it would not prove at all surprising if higher prices would be named when books are opened for first quarter of next year.

That there has not been a change in the $120 price before this is attributed principally to the fact that producers quoting this figure have been able to work on ore bought under long-term contracts at lower prices than have been ruling in the going market on manganese ore for many months past. Supplies of this cheaper ore have begun to run out.

Equipment

Seattle—Requirements of Bonneville power administration, U. S. engineers and other public agencies dominate this market, while state and county units seek to meet their needs for road construction and maintenance machinery. Seattle transportation commission has been unable to obtain additional equipment for the municipal system. Bonneville received three identical bids, $16,945, for crossarm fixtures for the Oregon City-Salem line. Bids were opened Oct. 7 for pneumatic drills and accessories and Oct. 13 tenders will be opened for ten gas powered drum hoists for Ampere, Wash. Consolidated Builders Inc., contractors at Coulee dam, are low to reclamation bureau at $50,455, for furnishing excavating machin-

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THE METAL WORKING JOBS
THIS MACHINE CAN DO . . .
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● Every operating man knows that the fabricating of complicated forms can raise havoc with production schedules. It means extra time, extra machines, extra labor . . . The Buffalo Universal Iron Worker puts an end to all those slow, old-fashioned operations. Here's a compact, modern machine to handle a whole job.
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ANGLES . . TEES . . ROUNDS . . I-BEAMS
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FLAT STEEL
● Buffalo Universal Iron Workers are easy to operate, fast and accurate. The saving per finished unit is mighty important, too! Sizes to fit your job. Write for Bulletin 331-A.
BUFFALO FORGE COMPANY
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Kitchener, Ontario
"Buffalo" UNIVERSAL IRON WORKERS

ery, pumps, boilers and other equipment. Siems-Drake-Puget Sound has purchased two 25-yard trucks from Six Wheels Inc. for the Juneau airbase project. U. S. engineer, Portland, has called bids Oct. 28 for 15-kv. metal enclosed buses and bus extras for units 7 to 10, Bonneville dam. Denver has called bids Oct. 17 for 18 cast steel draft tube pier noses.

Tungsten Prices Higher; Supply Is Increasing

Domestic scheelite prices are tending slowly upward, now holding around $25 to $26, duty paid equivalent, compared with $24 to $25 recently. Chinese wolframite, which is coming in for the account of the Metals Reserve Co. and being allocated to consumers, is showing little change, with the general range $24.50 to $25, duty paid.

Shipments from China are said to be coming through with regularity and this fact, combined with increasing domestic production, is providing an adequate supply for all purposes where tungsten is regarded as essential. Moreover, shipments are beginning to come in from Bolivia for refining, to meet domestic requirements. Little, if any, of this, however, at least that which is arriving for Metal Reserve's account, has been moved along to consumers.

Tungsten metal powder prices are stronger at $2.60 to $2.70 per pound, for 98 to 99 per cent material.

Relaying Rails Will Serve Ordnance Plant

St. Louis-Southwestern railroad has been authorized by Federal court to sell 28 track miles of 85-pound relaying rails and accessories, 3956 gross tons, at $30 per ton, a total of $116,680. The rail will be used to lay tracks to serve a government ordnance plant being built at Texarkana, Tex.

IT'S A BROSIUS VALVE!

Brosius Goggle Valves are self-contained and independent of the gas lines.

All operating mechanism is placed outside the valves.

No obstruction to the flow of gas.

There is a minimum amount of gas lost during operation.

These valves may be either Hand Operated (top) or Motor Operated (bottom) as illustrated.

Edgar E. BROSIUS Inc.

MANUFACTURERS & DESIGNERS OF SPECIAL EQUIPMENT FOR BLAST FURNACES AND STEEL MILLS

PITTSBURGH SHARPSBURG BRANCH, PA.

Brosius Equipment is covered by patents allowed and pending in the United States and Foreign Countries.

Nonferrous Metals

New York—OPA announced that a schedule establishing a maximum price of 8.25c, East St. Louis on zinc is being prepared and that the new prices could go into effect at once. Permitting the price of a major commodity to advance may mark the beginning of a new policy under which other metals, including copper and lead, may rise if study by the OPA staff discloses that a rise is necessary to maintain and expand supply.

Copper—There is no clear-cut opinion in the trade that raising of the zinc price will mean an increase in copper prices but it is felt that the way may be opened to that end. All copper continues to be sold at 12.00c or at higher prices where OPA has granted sellers permission to carry out old contracts. OPA revised the copper scrap price schedule, establishing ceiling prices on the basis of 10.00c for No. 1 copper wire and heavy copper; permitting the addition of transportation costs to the buyer's plant or warehouse; and eliminating any stipulation of a special margin for dealer's services. A premium of ½-cent a pound may be charged on shipments of 40,000 pounds or more at one time. In the case of No. 1 copper scrap and crucible shapes, a premium of 1.5 cents a pound may be charged for preparation.

Lead—Main concern of sellers continues to be that of getting out shipments. Distribution has not been affected so far by full priority regulations, no provision having been made to date for an emergency pool. Contributions likely will be made during November at the earliest.

Zinc—All slab zinc prices advanced to the basis of 8.25c, East St. Louis, for prime western while some sellers of zinc products and zinc bearing material put into effect proportionate advances. Zinc ore advanced to the highest level in 15 years at $55.28 a ton, Joplin. Brass ingot and brass mill products may advance shortly in line with the primary market.

Tin—Far Eastern prices advanced to levels which made the cost of importing tin more than the maximum 52-cent price allowed.

Nonferrous Metal Prices

Oct.	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin, New York: Spot	Straits Tin, New York: Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
1-8	12.00	12.12½	11.75	52.00	52.00	5.85	5.70	7.25	15.00	14.00	35.00
9-10	12.00	12.12½	11.75	52.00	52.00	5.85	5.70	8.25	15.00	14.00	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.10
Zinc, 100 lb. base	13.50

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Dealers' Buying Prices

No. 1 Composition Red Brass

New York	10.00-10.25
Cleveland	10.50-10.75
Chicago	10.25-10.50
St. Louis	10.50

Heavy Copper and Wire

New York, No. 1	10.00
Cleveland, No. 1	10.00
Chicago, No. 1	10.00
St. Louis	10.00

Composition Brass Turnings

New York	9.25-9.50

Light Copper

New York	8.00
Cleveland	8.00
Chicago	8.00
St. Louis	8.00

Light Brass

Cleveland	6.00-6.25
Chicago	6.00-6.25
St. Louis	6.00-6.25

Lead

New York	5.25
Cleveland	5.00-5.25
Chicago	4.75-5.00
St. Louis	4.75-5.00

Old Zinc

New York	4.50
Cleveland	4.00-4.12½
St. Louis	4.50-5.00

Aluminum

Mis., cast	11.00
Borings, No. 12	9.50
Other than No. 12	10.00
Clips, pure	13.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l. c. l.	13.25
Standard No. 12 aluminum	16.00

Jobbers Slow To File On Small Tool Orders

LOS ANGELES

■ Manufacturers of small hand tools are experiencing difficulty in inducing jobbers to file affidavit form PD-25-C which the former must have in order to obtain priorities for the purchase of steel and supplies. This situation is becoming troublesome to manufacturers, according to Dillon Stevens, Plumb Tool Co., Los Angeles, and chairman of the co-ordinating committee for national defense of the Service Tools Institute. The latter body comprises makers of wrenches, pliers, cold chisels, screwdrivers, etc.

Under the Defense Supplies Rating Plan, distributing outlets for small tools are required to furnish their suppliers monthly with true statements of the percentage of sales of tools going directly or indirectly for defense use. Manufacturers coordinate and compile these various statements and from them make their request for a priority to obtain raw materials needed to make the tools for replacement of distributor's stocks.

Toolmakers point out that they must limit supplies of tools furnished those merchants who show a low percentage going to defense channels, and that they are justified in cutting off supplies completely to merchants who fail to return the required report forms properly filled out.

★ Changing over to DBL High Speed Steel is just about the finest protection any user of cutting tools can get.

DBL complies with OPM orders, protects you against tungsten shortage and aids the nation's conservation program for defense, because it contains less than one-third as much tungsten as "18-4-1" High Speed Steel.

It protects you against loss of production, because in 85-90% of all cases, it performs just as well and frequently better than 18-4-1. And it protects you against buying any new equipment or learning new techniques, because it heat-treats in exactly the same equipment and by the same methods as 18-4-1.

Solve your High Speed Steel problems, once and for all, by changing over to DBL. All you need is the DBL "Blue Sheet," which contains full technical data. *Mail the coupon below for your copy.*

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Allegheny Ludlum Steel Corp. T-157
Oliver Building, Pittsburgh, Pa.
Send me a copy of "DBL Blue Sheet."
Name.....
Company.....
Address.....

Scrap Priorities

(*Concluded from page 79*)

fense, for private account, and for export, and it is necessary in the public interest and to promote the defense of the United States to conserve the supply and direct the distribution thereof.

NOW, THEREFORE, IT IS HEREBY ORDERED:

965.1 GENERAL PREFERENCE ORDER. **(a) Priority Control.** All the provisions and definitions of Priorities Regulation No. 1, issued by the Director of Priorities on Aug. 27, 1941 (Part 944), as amended from time to time, are hereby included as a part of this Order with the same effect as if specifically set forth herein, except as otherwise specifically provided herein.

(b) Additional Definitions. For the purposes of this Order:

(1) "Scrap" means "all ferrous materials, either alloyed or unalloyed, of which iron or steel is a principal component, which are the waste of industrial fabrication, or objects that have been discarded on account of obsolescence, failure or other reason."

(2) "Producer" means any person who produces Scrap in the conduct of a business or other enterprise.

(3) "Dealer" and/or "Broker" means any person who, as principal or as agent, buys and sells Scrap in the regular course of his business.

(4) "Consumer" means any person who uses Scrap in the production of iron, steel or ferro-alloy material or products.

(c) Provisions relating to Producers. On or before the 15th day of each month, beginning Nov. 15, 1941, Producers who have during the preceding month produced 20 gross tons or more of Scrap shall file reports as prescribed by the Director of Priorities showing Scrap inventory, production and sales, and such other information as the Director may from time to time require.

(d) Provisions relating to Dealers and Brokers. On or before the 15th day of each month, beginning Nov. 15, 1941, Dealers and Brokers shall file reports as prescribed by the Director of Priorities, showing Scrap inventory, purchases and sales, and such other information as the Director may from time to time require.

(e) Provisions relating to Consumers. On or before the 15th day of each month, beginning Nov. 15, 1941, Consumers shall file reports as prescribed by the Director of Priorities, showing Scrap inventory, production, receipts and consumption, and such other information as the Director may from time to time require.

(f) Special Instructions. The Director of Priorities may from time to time issue specific directions to any person as to the source, destination, or amount of Scrap to be delivered or acquired by such person.

(g) Violations. Any person affected by this Order who falsifies records or reports which he is required by this Order to keep or file, or who violates any other provision of this Order or any other Order, regulation, or other directive issued by the Office of Production Management may be prohibited by the Director of Prioritties from making or receiving deliveries of Scrap, or may be subjected to such other or further action as the Director may deem appropriate.

(h) Effective Dates. This Order shall take effect immediately, and, unless sooner terminated by direction of the Director of Priorities, shall expire on the 30th day of June, 1942.

Donald M. Nelson,
Director of Priorities

Henderson Denies Scrap Price Ceiling Will Be Changed

Rumor circulating in the iron and steel scrap trade that the Office

LET'S GET DOWN TO CASES ... about Solder

Precision in manufacturing assumes precision in *every detail*—including *precisely* the right formula of alloy and flux for each soldering operation. Add to that the need for the right *quantity* of solder and flux, in controlled balance, and you have the stage set for Kester Cored Solders.

All Kester Cored Solders are finest quality—chemically pure fluxes self-contained in virgin metal alloys. Available in countless combinations of different alloys and fluxes, in various sizes of strand and core, they give you the *precise* answer to the question, "Which solder-formula is best?"

Consult Kester engineers, without obligation, about any metal-joining operation. Send a detailed description of your problem. It will have prompt attention.

KESTER FLUXES
If your operation calls for the use of a separate flux, specify KESTER
Viscoziformed Paste
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Canadian Plant: Brantford, Ont.

KESTER CORED SOLDERS
STANDARD FOR INDUSTRY

of Price Administration is considering an increase in ceiling prices were denied last week by Price Administrator Henderson.

Mr. Henderson also declared untrue reports that his office plans to change or eliminate various grades of scrap covered by the schedule so that higher ceiling prices would result for some types.

One of the largest brokers and dealers in iron and steel scrap has agreed to refund to buyers all amounts collected in excess of the established ceiling prices in respect to every such sale made since Sept. 2 as the result of action taken by Price Administrator Leon Henderson.

This represents the first direct step by Mr. Henderson under his policy to compel strict compliance with the scrap schedule by the use of "all necessary sanctions" at his command. Notice of this policy was given to a meeting of scrap brokers and dealers and representatives of steel mills and foundries on Aug. 28. Rigid enforcement would begin as of Sept. 2, the administrator told the gathering.

Evidence of violations by other members of the trade is in OPA's possession, Mr. Henderson said today, and action against these offenders is impending.

227 Industrial Truck Units Booked in August

■ Electric industrial truck bookings in August totaled 227 units, compared with 273 units in July, according to the Industrial Truck Statistical Association, 208 South LaSalle street, Chicago. Combined net value for chassis only at factories was $745,599, against $1,059,093 in July.

Bookings in the month included: 30 nonelevating platform trucks with total net value at factories $63,339; cantilever trucks, 155, total net value at factories, $594,037; light and heavy duty tractors, 13, combined net value at factories $21,755; crane trucks, 10, combined value $62,508; and one special scoop shovel truck valued at $3960.

All net values are at factories after additions and deductions for variations from standard specifications, trade-in allowances and other factors.

Detailed information on the month's sales may be secured from the association.

Red, White, Blue Cards Mark Defense Steel

■ American Rolling Mill Co., Middletown, O., has devised special red, white and blue routing cards to mark steel earmarked for defense purposes. The cards enable workers to recognize defense steel readily and expedite it through the mills. The cards accompany the steel from the time it is rolled until it is shipped.

Cold Metal Process Co. Organizes Subsidiary

■ Cold Metal Process Co., Youngstown, O., has organized a subsidiary, Cold Metal Products Co., which will take over manufacturing operations heretofore conducted by the former.

Manufacturing divisions incorporated into Cold Metal Products Co. include: Designing and building rolling mills and accessory equipment, and strip steel division, which produces special sizes and qualities of precision cold rolled strip steel.

Officers of Cold Metal Products Co.: L. A. Beeghly, chairman V. J. Lamb, president H. S. Lamb, vice president; W. H. Kilcawley, secretary-treasurer; W. B. Lockwood general manager; C. M. Beeghly, manager, strip steel division.

Offices of the new company will remain at the plant in Youngstown.

SEE ARMCO "DEFENSE" METALS

AT THE SHOW

Saving money and improving products are good reasons for bringing your "defense" metal equipment problems to ARMCO. One way to do it is to talk with experienced ARMCO men in Booth F 31 at the National Metal Congress in Philadelphia.

"Defense" will be the keynote of the ARMCO exhibit. Among other metal products you will see a complete air-raid and munitions shelter partly buried in a miniature hillside.

An information booth will be there for your convenience. Here questions on uses, welding, finishing and forming of various metal sheets for defense jobs will be answered by ARMCO engineers. They will also show fabricating and finishing operations on such ARMCO specialty sheets as Stainless Steel, PAINTGRIP and ZINCGRIP.

ARMCO representatives at the Show will gladly discuss specific applications with you. At other times write direct to us for information on ARMCO metals in your defense products. The American Rolling Mill Co., 3021 Curtis St., Middletown, Ohio.

VISIT THE ARMCO BOOTH...F31

Stringent Rules For Copper Products, Alloys

WASHINGTON

■ New stringent regulations, minutely governing distribution of copper products or copper alloys has been sent to all fabricators by Donald M. Nelson, director of priorities.

The government has attempted by this means to close all loopholes which might allow hoarding, overbuying, or over-stocking of these materials. The announced intention is to make sure that only immediate needs are being served.

Thus, it may be possible to conserve some additional supplies for hard-pressed "essential" civilian industries.

The new rules apply to all buyers, including both the army and navy as well as industrial consumers, and regardless of how high their priority ratings are.

Brass fabricators must now receive from their customers a statement showing for what purpose the material ordered is to be used, how soon it will be placed in production, etc. Previously brass fabricators simply had to get a statement to the effect that the purchased material would not increase inventories above specified limits.

Alcoa Upheld in Antitrust Action

■ Aluminum Co. of America last week was upheld by Federal Judge Francis G. Caffey in United States District Court, New York, in the antitrust suit instituted by the government.

Reading of the opinion required more than a week.

The jurist ruled the government failed to prove any of its monopoly charges and accusations of conspiracy. As to whether Alcoa and Aluminum Ltd. agreed to fix prices or restrain imports, Judge Caffey said: "Not only has the government failed to establish the charge but the evidence is convincing the other way."

Steel Corp. Shipments Set Two New Records

■ Finished steel shipped in September by United States Steel Corp. totaled 1,664,227 net tons, a decrease of 89,438 tons from 1,753,665 tons in August; and an increase of 271,389 tons over September, 1940, shipments of 1,392,838 tons. September shipments were the highest on record for that month, the prior peak being in 1920 at 1,421,625 tons.

Shipments for nine months also were a record for the period, at 15,137,436 tons, compared with 10,433,727 tons last year. The previous high for first three quarters was made in 1929 with 13,450,298 tons.

(Inter-company shipments not included)
Net Tons

	1941	1940	1939	1938
Jan.	1,682,454	1,145,592	870,866	570,264
Feb.	1,548,451	1,009,256	747,427	522,395
March	1,790,366	931,905	845,108	627,047
April	1,687,674	907,904	771,752	550,551
May	1,745,295	1,084,057	795,689	509,811
June	1,668,637	1,209,684	807,562	524,994
July	1,666,667	1,296,887	745,364	484,611
Aug.	1,753,665	1,455,604	885,636	615,521
Sept.	1,664,227	1,392,838	1,086,683	635,645
Oct.	.....	1,572,408	1,345,855	730,312
Nov.	.....	1,425,352	1,406,205	749,328
Dec.	.....	1,544,623	1,443,969	765,868
Total, by Mos.	.....	14,976,110	11,752,116	7,286,347
Adjustment	.....	†37,639	*44,865	†29,159
Total	.....	15,013,749	11,707,251	7,315,506

†Increase. *Decrease.

Standard Container Inc., Bloomfield, N. J., has purchased the former Liondale Bleach Dye & Print Works plant, containing 250,000 square feet of space, at Rockaway, N. J. The plant will be used for manufacture of shell cases and containers and other defense materials.

THE S F Co.

THE SHENANGO FURNACE CO.

LAKE SUPERIOR IRON ORES
Bessemer—Non-Bessemer—Aluminiferous

"SHENANGO" PIG IRON
Bessemer—Malleable—Basic—Foundry

W. P. SNYDER & COMPANY

Iron Ore • Pig Iron
Coal and Coke

OLIVER BUILDING PITTSBURGH, PA.

It is axiomatic that an open hearth furnace functions no better than its valves; that's why it will pay you to investigate . . . . . .

NICHOLSON CONTROL VALVES FOR OPEN HEARTH FURNACES

This valve is popular on open hearths to alternate the flow of oil and steam to the oil burners. It is a valve that stands up under rough treatment and gives long, trouble-free service because it is designed and made for faithful operation. Also make valves suitable for operating air, steam, water or oil cylinders on pressures up to 300 lbs. For complete information and engineering data on this and other valves (foot, solenoid and motor operated) write for our catalog No. 140.

LOW-PRICE CONTROL VALVE

This 3-and 4-way style J lever operated valve for air and oil pressures up to 125 lbs. has been designed to meet the demand for a low-priced air and oil valve for operating cylinders. You will read all about it in our catalog No. 140.

OTHER NICHOLSON PRODUCTS:
Nicholson welded floats, piston and weight operated traps. Flexible couplings, expanding mandrels, arbor presses, compression shaft couplings, steam eliminators and separators. Compressed air traps.

W. H. NICHOLSON & COMPANY
177 OREGON ST., WILKES-BARRE, PA.

Heppenstall Gives X-Ray Machine to English Town

■ Modern X-ray machine, offered to the borough of Rotherham, England, by C. W. Heppenstall, president and treasurer, Heppenstall Co., Pittsburgh, has been accepted as "about the most precious gift" that could be asked.

Mr. Heppenstall, whose family has been engaged in the steel business in Rotherham for 150 years, made his offer to Alfred R. Habershon, former lord mayor and head of a large steel concern there. Rotherham is five miles outside Sheffield, England's famous steel center.

Heppenstall Co., manufacturer of alloy and carbon steel, was founded in 1889 as the Trethewey Mfg. Co. by Sam Heppenstall, father of C. W.

Purchase of the machine was made through a branch of an American firm for immediate shipment. Efforts were made to secure the apparatus in England, but none was available.

Navy Honors Mesta With "E" and Flag

■ Mesta Machine Co., Pittsburgh, recently was awarded the Navy "E" pennant and the Bureau of Ordnance flag in recognition of outstanding performance in the production of materials and equipment essential to the Navy. Presentation was made by Rear Admiral Wat T. Cluverius, United States Navy, retired.

CONSTRUCTION and ENTERPRISE

Ohio

CLEVELAND—Apex Electrical Mfg. Co., 1070 East 152nd street, will build a machine shop addition at 1110 East 152nd street, two stories, 47,000 square feet floor space on each floor.

CLEVELAND — Cleveland Graphite Bronze Co., 16800 St. Clair avenue, will build a boiler plant costing about $200,000. George Saltzman is plant manager. Albert W. Higley Co., 2036 East Twenty-second street, has the contract.

CLEVELAND—Electric Alloy Processing Inc. is being organized by J. J. Wodisky, 814 Engineers building, and associates.

CLEVELAND—Bender Mfg. & Repair Co., 2135 Columbus road, newly incorporated, is installing equipment for automobile body building and has taken on some work. Joseph Bender is president.

WARREN, O.—American Welding & Mfg. Co. has arranged with Defense Plant Corp. Washington, for a plant to produce tank parts, costing about $484,000, of which about $350,000 will be for equipment. E. W. Wilhelmy is secretary.

Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 273 and Reinforcing Bars Pending on page 275 in this issue.

Connecticut

BRISTOL, CONN.—New Departure division of General Motors Corp., 269 North Main street, has let contract for a one-story 160 x 583-foot unit, plant C, to George A. Fuller Co., 587 Madison avenue, New York. Cost estimated at $500,000. (Noted Sept. 8.)

MILFORD, CONN.—Milford Rivet & Machine Co. is building a one-story addition 30 x 110 feet, to cost about $45,000. (Previously reported in error as Milford, Mass.)

NEW BRITAIN, CONN.—Fafnir Bearing Co., 37 Booth street, is having plans made for a two-story 50 x 250-foot plant addition, to cost about $90,000.

Rhode Island

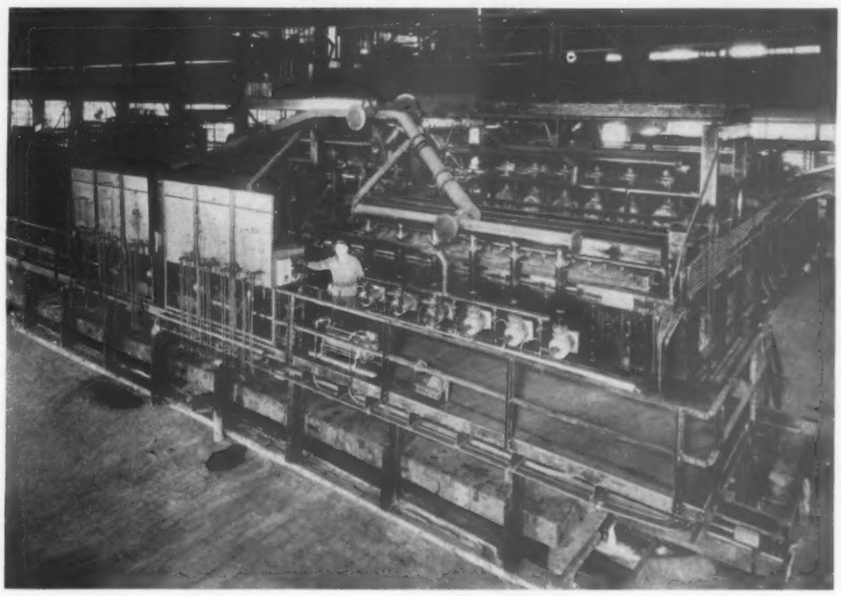
PAWTUCKET, R. I. — Crompton & Knowles, 300 Armistice boulevard, is building one-story 25 x 75-foot and 57 x 112-foot additions. Contract has been given to Bowerman Bros., 70 Bath street, Providence, R. I. Cost estimated at $40,000.

New Jersey

IRVINGTON, N. J.—Irvington Smelting & Refining Works, 374 Nye avenue, will build a one-story 84 x 110-foot storage building, contract to Frank D. Trainor & Son Inc., 12 Smith street. Estimated cost about $40,000.

KEARNY, N. J.—Kearny Mfg. Co. Inc., 681 Schuyler avenue, will build one-

★BLOOM★
Long Flame Burners



A battery of Bloom Long Flame Burners in a Triple Fired Furnace

THIS burner produces the type of flame so necessary for the modern heating furnace. Quality in heating operations requires the right flame properly applied. Our recommendations are backed by experience in the use of over 5000 burners on all types of furnaces.

Consult our engineering department for complete information.

Write for complete information.

BLOOM ENGINEERING CO.
PITTSBURGH, PA.

Chicago District: 452 Grant St., Gary, Ind. *Phone:* Gary 5129

story 72 x 90 feet, two-story 21 x 60 feet additions and a 20 x 30-foot boiler house. Contract has been given to Schroeder Construction Co., 1009 Eighteenth avenue, Newark, N. J. C. F. Warren, 158 Magnolia avenue, Arlington, N. J., is architect.

NEW BRUNSWICK, N. J.—Quimby Pump Co. Inc., 340 Thomas street, Newark, N. J., has let contract to James F. Mitchell Inc., 40 Clinton street, Newark, at about $80,000 for a one-story 112 x 240-foot pump manufacturing plant.

Pennsylvania

GETTYSBURG, PA.—REA has allotted $487,000 to Adams electric co-operative, Calvin A. Cluck, superintendent, for 396 miles of rural electric lines to serve about 1300 customers.

LANSDOWNE, PA. — Detroit Steel Products Co., 2250 East Grand boulevard, Detroit, has let contract to H. E. Baton Inc., 1717 Sansom street, Philadelphia, for reconstructing its plant at Fernwood, a suburb, at cost of over $40,000. Ballinger Co., 105 South Twelfth street, Philadelphia, is architect and engineer.

PITTSBURGH—Crucible Steel Co. of America, J. S. Billingsley, district manager, Oliver building, has let contract for a steel mill building to Minotti Bros., Home building, to cost over $40,000.

Michigan

DETROIT—Mechanical Specialties Inc., 12601 East McNichols road, has been incorporated with $10,000 capital to manufacture dies and patterns, by John F. Leven, 12404 Waltham avenue, Detroit.

DETROIT—Tri-Way Machine Shop Inc. has been incorporated with $1500 capital to deal in machinery, by Engelbert Teichman, 18479 Keystone avenue, Detroit.

FENTON, MICH.—Dery Machine & Tool Co., 403 South Leroy street, has been incorporated with $5000 capital to manufacture tools and dies, by John H. Dery Jr., Fenton.

INKSTER, MICH.—Dalcoe Tool & Mfg. Co. has been incorporated with $10,000 capital to manufacture tools, by Albert Talch, 19106 Outer drive, Dearborn, Mich.

Illinois

EAST ST. LOUIS, ILL. — Socony-Vacuum Oil Co., 26 Broadway, New York, has submitted plans to the War department for a $1,000,000 plant adjacent to its works here for production of toluene, with capacity of 1,500,000 gallons, material to be used at explosives plant at Weldon Springs, Mo.

FLORA, ILL.—Clay electric co-operative, Michael Drozen & Associates, St. Louis, consulting engineers, has awarded contract to Cater Construction Co., Blue Springs, Mo., at $203,613 for 289 miles of rural transmission lines to serve 605 subscribers.

Indiana

MUNCIE, IND.—Broderick Boiler Co., Macedonia avenue, has plans for plant additions to cost about $60,000, including equipment.

Maryland

BALTIMORE—Defense Plant Corp. has bought 10-acre site for plant to be operated by tube division of Revere Copper & Brass Inc. for United States navy, producing tubes for condensers of ship steam power plants.

HAGERSTOWN, MD.—Fairchild Engine

NEW Longer-lasting Rack Insulation

UNICHROME* "AIR DRY" RACK COATING

Saves Time and Money!

Unichrome "Air Dry" Rack Coating will save time and money in your plating room—as it has for hundreds of others.

First, because of the speed and ease with which Unichrome "Air Dry" is applied. Racks can be dipped in the shipping container—coatings dry at room temperature.

Second, because the need for recoating is reduced. The thick, tough flexible coatings withstand normal handling, hot cleaners and even severe plating cycles without chipping, peeling or splitting.

Third, because Unichrome "Air Dry", properly applied will reduce to a minimum any waste of valuable metals otherwise deposited on racks or fittings.

Here are the seven big time- and money-saving advantages at a glance:

INSOLUBLE—withstands hot cleaners and all plating solutions

SAFE—contains no ingredients harmful to plating solutions

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CONVENIENT—any part can be patched without recoating the entire rack

EASILY APPLIED—dipping is done in the container in which it is shipped—the material dries at room temperature.

Address requests for further information or a trial order to the nearest office below.

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Waterbury, Conn.

*Trade Mark
Reg. U.S. Pat. Off.

& Airplane Corp. is receiving bids through Albert Kahn Inc., 345 New Center building, Detroit, for additional plant facilities to cost about $1,600,000.

Kentucky

HAZARD, KY.—Kentucky & West Virginia Power Co. has applied to public service commission for permission to construct an additional 35,000-kw. unit in plant near here at cost of about $4,000,000.

North Carolina

HIGH POINT, N. C.—City asked PWA for additional $1,500,000 loan for erection of steam generating plant to supplement proposed hydroelectric plant.

Tennessee

WINCHESTER, TENN. — Joe Davis, mayor, announces city seeks federal funds to finance $69,000 program for waterworks improvement, $30,000 for municipal refuse incinerator and $98,000 for street resurfacing. Waterworks improvements will include 150,000-gallon steel tank on tower.

Virginia

PARKSLEY, VA. — Accomack-Northampton electric co-operative, W. B. Irby Jr., superintendent, has let contract to Rockingham Construction Co., Harrisonburg, Va., at $225,809 for construction of 293 miles of rural transmission lines to serve 1216 customers. Welles Engineering Co., Front Royal, Va., are engineers.

Missouri

COLUMBIA, MO.—City, Rex Barrett, mayor, is having plans made for additional power plant equipment, including deaerating equipment and other appurtenances. Burns & McDonnell Engineering Co., 107 West Linwood boulevard, Kansas City, Mo., is engineer.

IRONTON, MO.—Black river electric co-operative, Ray Brown, superintendent, has let contract to Henry Jaeger, West Allis, Wis., for 224 miles of rural transmission lines to serve 481 customers.

JOPLIN, MO.—City, J. J. Saunders, commissioner, is having preliminary plans made for a sewage disposal plant to cost about $400,000. H. T. Lawrence, 3244 NW Fourteenth street, Oklahoma City, Okla., is consulting engineer.

NEOSHA, MO.—City has completed survey for construction of a sewage disposal plant to cost $262,000 and a water system, including filter system, to cost $353,535. H. T. Lawrence, 3244 NW Fourteenth street, Oklahoma City, Okla., is consulting engineer. (Noted Sept. 15.)

Oklahoma

CHOREAU, OKLA.—City, H. V. Grant, mayor, has applied to PWA for funds for water and sewage system to cost about $300,000. T. P. Clonts, Choteau, is consulting engineer.

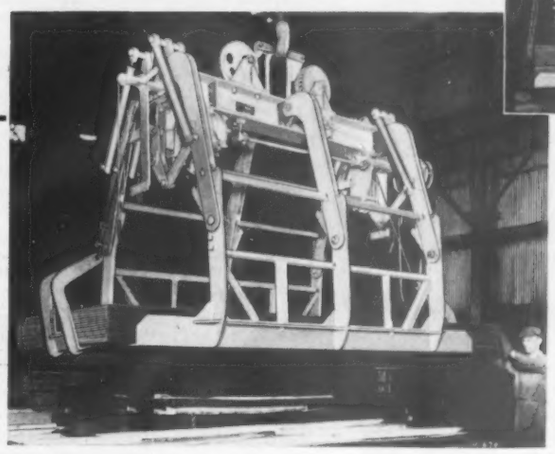
VINITA, OKLA. — REA has allotted $218,000 to Northeast Oklahoma electric co-operative, William C. Atkinson, superintendent, for construction of 207 miles of rural transmission lines to serve 543 customers.

VINITA, OKLA.—Grand River Dam Authority has applied to PWA for funds to finance substations, transformers and transmission lines to Cookson Hills army cantonment at Muskogee at cost of about $146,000. W. R. Holway, Vinita, is consulting engineer.

Wisconsin

BELOIT, WIS.—Wisconsin Power &

FAST, SAFE, SHEET STEEL HANDLING IN LOADS FROM 2 TO 60 TONS WITH POSITIVE "ONE-MAN" CONTROL . . .



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Save your own time and money by taking advantage of our free engineering service. Our staff of competent engineers is ready to help you, not only to recommend the proper pumps but to help you in solving your pumping problems in general. If there is a Roper office in your city, consult one of our representatives. Each Roper representative has a thorough knowledge of engineering and a wealth of practical experience. Don't put it off any longer. Let us help you with that pumping problem that has you guessing. We will be glad to serve you.

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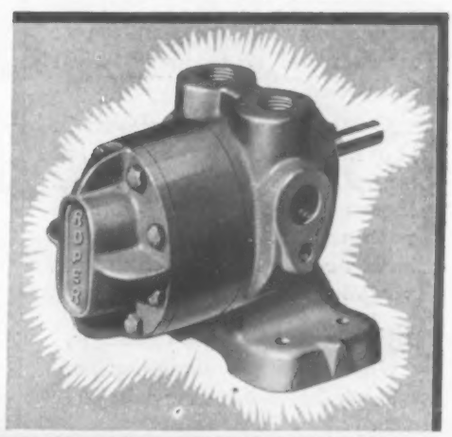


ROPER *Rotary* PUMPS

Light Co., 122 West Washington avenue, Madison, Wis., will build power plant, substations and cable lines, to cost about $4,000,000, including equipment. Sargent & Lundy, 140 South Dearborn street, Chicago, are engineers.

GENOA, WIS.—Tri-state power co-operative, J. N. Gunderhaug, manager, will take bids soon on addition to power plant, estimated to cost about $800,000. Rural Line Engineers, Clayton, Mo., are engineers.

IRON RIVER, WIS.—REA has allotted $202,000 to Bayfield electric co-operative for 246 miles of rural transmission lines to serve 619 customers.

STEVENS POINT, WIS.—Consolidated Water Power Co., William F. Thiele, chief engineer, is having plans prepared for a dam, powerhouse, transmission lines and equipment, to cost an estimated $2,215,039.

WAUSAU, WIS. — REA has allotted $192,000, to Marathon, Portage electric co-operative to finance 210 miles of rural transmission lines to serve 494 customers.

Minnesota

ALBANY, MINN.—City, E. S. Winter, clerk, will take bids soon on sewage treatment plant to cost about $30,000. Ealy G. Briggs, 1955 University avenue, St. Paul, is engineer.

SARGENT, MINN. — Village, Theo. Knutson, clerk, will take bids about Oct. 25 on sewage disposal plant and sewers. Ealy G. Briggs, 1955 University avenue, St. Paul, is engineer.

STILLWATER, MINN.—WPA has allotted $264,710 for sewage disposal plant and interceptor sewer. John Gillin is city clerk. Williams & Burlingame, 418 West Willard street, Stillwater, are engineers.

WALTHAM, MINN.—Village, E. R. Bjork, clerk, is having plans made for a waterworks system, including 50,000-gallon tank on tower. Ealy G. Briggs, 1955 University avenue, St. Paul, is engineer.

Texas

GILMER, TEX.—Farmers Electric Generating Co-operative, Sam Scales, manager, has rejected bids and will call new bids on three natural gas engine driven connected generating units. Freese & Nichols, 407 Capps building, Fort Worth, Tex., are consulting engineers. (Noted July 21.)

HOUSTON, TEX.—Ebasco Services Inc., 2 Rector street, New York, is designing new 35,000-kw. generating station for Houston Lighting & Power Co., Electric building, Houston.

FORT WORTH, TEX.—Brazos river electric co-operative has given contract to Taylor Construction Co., Taylor, Tex., at $567,376 for 320 miles of rural transmission line. H. B. Gieb & Co., 1207 Texas bank building, Dallas, Tex., are engineers.

Kansas

EMPORIA, KANS.—City, Robert W. Cunningham, city engineer, will apply to WPA for funds for waterworks construction, including 1,000,000-gallon steel tank on tower and pumps, costing $55,000; 3,000,000-gallon reinforced concrete storage tank, costing $80,000; other equipment to cost $55,000, at north sewage disposal plant. Paulette & Wilson, 1006 Kansas avenue, Topeka, Kans., are consulting engineers.

IOLA, KANS.—Allen county light and power co-operative, will ask bids soon for construction of 225 miles of rural transmission lines costing about $207,000. Paulette & Wilson, 1006 Kansas avenue, Topeka, Kans., are engineers.

South Dakota

MILBANK, S. DAK.—Whetstone Valley Electric Association has given contract to Zontelli Bros., Ironton, Minn., at $115,368, for 189 miles rural transmission lines to serve 277 customers. Banister Engineering Co., 1586 University avenue, St. Paul, Minn., is engineer.

SIOUX FALLS, S. DAK.—City, C. M. Whitfield, auditor, plans an election on issuance of $100,000 in bonds to finance sewage disposal plant. R. E. Bragstad is city engineer.

Nebraska

COLUMBUS, NEBR.—Loup river public power district, Harold Kramer, secretary, will take bids about Nov. 1 for construction of 115-kv. transmission line from Grand Island to Omaha substation, about 150 miles.

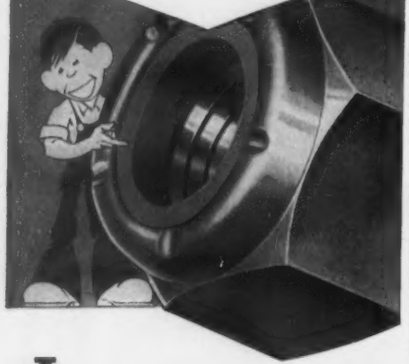
GOTHENBURG, NEBR.—City, C. F. Williams, clerk, will obtain plans for municipal power plant. Arthur Weideranders is city engineer. Cost is estimated at $45,000.

Iowa

HAWARDEN, IOWA—City, Elmer H. Erickson, clerk, takes bids to Oct. 15 for addition to municipal light plant, to cost about $92,000. Buell & Winter, 508 Insurance Exchange building, Sioux City, Iowa, are engineers.

LOGAN, IOWA—W. L. Yeaman, com-

See this self-locking nut... in many variations of type and size... at the **NATIONAL METAL EXPOSITION**



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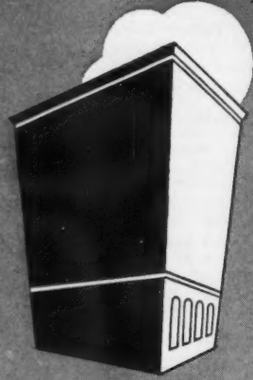

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DETROIT LELAND HOTEL

800 OUTSIDE ROOMS ALL WITH PRIVATE BATH ... SINGLE FROM $2.75 ... DOUBLE FROM $4.50

CHARLES H. LOTT
General Manager

mittee chairman, is investigating feasibility of constructing municipal power and light plant. Voters recently rejected new franchise to private power company.

NEW LONDON, IOWA—City council has decided to construct a sewage disposal plant and sewers estimated to cost $86,905, application to be made for PWA funds. W. A. Griffith is city engineer and Stanley Engineering Co., Muscatine, Iowa, is consulting engineer.

SMITHLAND, IOWA—WPA has approved project for construction of sewage disposal plant costing $43,055. F. W. Jones is city clerk.

WATERLOO, IOWA — Chamberlain Corp., manufacturer of wringers for automatic washing machines, has obtained permits for construction projects and improvements to cost about $25,000.

California

SAN FRANCISCO—Pacific Brass & Foundry Co., Second and Clementine streets, has plans for a one-story foundry plant to cost about $40,000. N. B. Green, 55 New Montgomery street, is engineer.

SAN FRANCISCO — A. Warmington, 190 Lake street, has let a contract for a machine shop to M. Drinkward, 1333 106th avenue, at about $40,000.

Oregon

EUGENE, OREG.—Lane County electric co-operative has received bids for 334 miles of power distribution lines, to cost about $410,000.

Washington

EVERETT, WASH.—Austin Co. has completed survey for proposed Whidby Island naval air base, estimated to cost $3,790,000, including $400,000 for pier, $480,000 for seaplane ramps and $700,000 for hangars. Contract will be awarded soon, probably to the Austin Co.

MOXEE, WASH.—Bids will be taken soon for proposed municipal water system, including elevated tank, pumps, pipe, etc.; $45,000 is available. G. D. Hall is engineer.

SEATTLE—Bellingham Iron Works has been incorporated with $5000 by Wayne C. Booth and associates, 1612 Northern Life Tower, Seattle.

SEATTLE—Truck Welding Co., 737 Ninth avenue North, plans an addition for storage.

Canada

KITCHENER, ONT.—Dominion Electrohome Industries Ltd., 39 Edward street, will build a machine shop costing $25,000, without equipment. Contract has been given to Ball Bros., 49 King street East.

NEW TORONTO, ONT. — Anaconda American Brass Ltd. will make alterations to plant and erect addition, to cost about $60,000, with equipment.

OTTAWA, ONT.—Ottawa Car & Aircraft Ltd., 301 Slater street, will build plant addition costing about $144,000, with equipment additional. Contract has been given to Doran Construction Co., 78 Bank street.

PETERBOROUGH, ONT. — Western Clock Co. Ltd., Hunter street East, will build addition costing about $100,000 and has given contract to A. W. Robertson Ltd., 57 Bloor street West, Toronto, Ont.

SAULT STE MARIE, ONT.—Algoma Steel Corp. Ltd., is having plans prepared for a boiler shop addition to cost $75,000, with equipment.

TORONTO, ONT. — Rogers Majestic Corp. Ltd., Fleet and Bathurst streets, manufacturer of electric equipment and radios, will build a plant addition costing about $370,000, bids to be called soon. T. Pringle & Son, 36 Toronto street, are engineers.

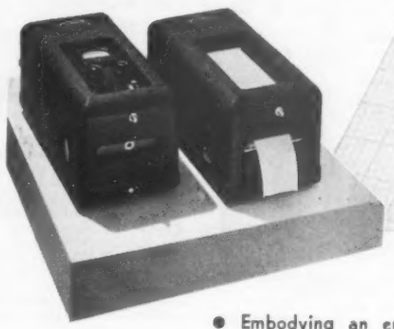
TORONTO, ONT. — Canada Illinois Tools Ltd., 177 Front street East, will build a plant addition for production of high-speed tools, etc., to cost about $100,000.

CHUTE-A-CARON, QUE.—Alcoa Power Co. Ltd., 1155 Metcalfe street, Montreal, Que., will install two additional power developments here, to cost about $1,000,000. General contract has been given to Foundation Co. of Canada Ltd., 1538 Sherbrooke street West, Montreal, and structural steel contract to Dominion Bridge Co. Ltd., Lachine, Que.

DORVAL, QUE.—Construction Equipment Co., 180 Valee street, Montreal, Que., will build a boiler and machine shop here, costing about $50,000.

SHERBROOKE, QUE. — Manganese Steel Castings Ltd., Abenaquis street, H. R. Neville, manager, will build a foundry addition costing about $75,000, with equipment.

VILLE ST. LAURENT, QUE.—Robert Mitchell Co. Ltd., 750 Belair avenue, will build a machine shop and foundry to cost about $85,000, with equipment. General contract has been given to Anglin Norcross Corp. Ltd., 892 Sherbrooke street West, Montreal, and structural steel to Dominion Structural Steel Co. Ltd., 6894 Clanranald avenue.



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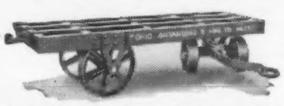

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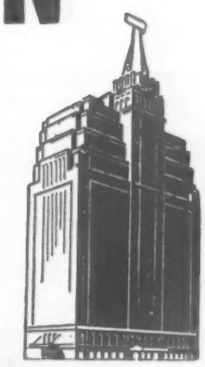

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Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

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Linde Air Products Co., The, 30 E. 42nd St., New York City.

BOILER HEADS
Bethlehem Steel Co., Bethlehem, Pa.

BOILER TUBES—See TUBES (Boiler)

BOILERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Oil Well Supply Co., Dallas, Texas.

BOLT AND NUT MACHINERY
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., The, Tiffin, O.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.
Waterbury Farrell Foundry & Machine Co., Waterbury, Conn.

BOLTS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
*Erie Bolt & Nut Co., Liberty Ave., at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BOLTS (Carriage and Machine)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

BOLTS (Non-Ferrous and Stainless)
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

WHERE-TO-BUY

BOLTS (Special)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS (Stove)
Central Screw Co., 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BOLTS (Stove, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

BOLTS (Track)—See TRACK BOLTS

BOOKS
International Correspondence Schools, Box 9377-B, Scranton, Pa.

BORING MACHINES (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.

BOXES (Annealing)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
National-Erie Corp., Erie, Pa.
Union Steel Casting Div. of Blaw-Knox Co., 62nd & Butler Sts., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

BOXES (Open Hearth Charging)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

BRAKE LININGS
Johns-Manville Corp., 22 E. 40th St., New York City.

BRAKES (Electric)
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.

BRAKES (Press)
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., 1125 E. 283rd St., Wickliffe, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.

BRICK (Chrome)
Harbison-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh, Pa.

BRICK—(Insulating)—See INSULATING BRICK

BRICK (Refractory)—See REFRACTORIES, CEMENT, ETC.

BRICK (Silica)
Harbison-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh, Pa.

BRICK (Silicon Carbide)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

BRIDGE CRANES (Ore and Coal Handling)—See CRANES (Bridge)

BRIDGES, BUILDINGS, VIADUCTS, STACKS, ETC.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Co., Blawnox, Pa.
Columbia Steel Co., San Francisco, Calif.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.

BROACHING CUTTERS
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BROACHING MACHINES
American Broach & Machine Co., Ann Arbor, Mich.
Bullard Co., The, Bridgeport, Conn.
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Colonial Broach Co., 147 Jos. Campau, Detroit, Mich.

BRUSHES (Carbon)
Ohio Carbon Co., 12508 Berea Rd., Cleveland, O.

BUCKETS (Clam Shell, Dragline Grab, Single Line)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Blaw-Knox Co., Blawnox, Pa.
Cullen-Friestedt Co., 1308 So. Kilbourn St., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

BUCKETS (Single Hook, Automatic Dump, Automatic Single Line)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

BUILDINGS (Steel)—See BRIDGES, BUILDINGS, ETC.

BULLDOZERS
Beatty Machine & Mfg. Co., Hammond, Ind.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

BURNERS (Acetylene)—See TORCHES AND BURNERS

BURNERS (Automatic)
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
North American Mfg. Co., The, 2910 E. 75th St., Cleveland, O.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Bloom Engineering Co., 916 Behan St., Pittsburgh, Pa.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

BURNERS (Fuel, Oil, Gas, Combination)
American Gas Furnace Co., Elizabeth, N. J.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Bloom Engineering Co., 916 Behan St., Pittsburgh, Pa.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
North American Mfg. Co., The, 2901 E. 75th St., Cleveland, O.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

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Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

BUSHINGS (Bronze)

Ampco Metal, Inc., Dept. S-1013, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Sumet Corporation, 1553 Fillmore Ave., Buffalo, N. Y.

BUSHINGS (Jig)

Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BUSHINGS (Oilless)

Rhoades, R. W., Metaline Co., P. O. Box 1, Long Island City, N. Y.

BY-PRODUCT PLANTS

Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

CADMIUM

Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

CADMIUM PLATING PROCESS

Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

CAISSONS (Pneumatic)

Dravo Corp., (Contracting Div.), Neville Island, Pittsburgh, Pa.

CALCIUM METAL AND ALLOYS

Electro Metallurgical Co., 30 E. 42nd St., New York City.

CAP SCREWS—See SCREWS (Cap, Set, Safety-Set)

CAPSTANS (Electric, Gasoline, Diesel)

Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CAR DUMPERS

Alliance Machine Co., The, Alliance, Ohio.
Industrial Brownhoist Corp., Bay City, Mich.

CAR PULLERS and SPOTTERS

American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Cullen-Friestedt Co., 1308 So. Kilbourn St., Chicago, Ill.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CARBIDE

Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Carbide Corp., 60 E. 42nd St., New York City.

CARS (Charging)

Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

CARS (Cinder Pot)

Pressed Steel Car Co., (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Dump)

Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
Pressed Steel Car Co., (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Industrial and Mining)

Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Differential Steel Car Co., Findlay, O.
Pressed Steel Car Co., (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Scale)

Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

CASTING WASHER EQUIPMENT

Pangborn Corp., Hagerstown, Md.

CASTINGS (Acid Resisting)

Ampco Metal, Inc., Dept. S-1013, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
International Nickel Co., Inc., The, 67 Wall St., New York City.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Alloy Iron)

National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.

CASTINGS (Alloy Steel)

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Electro Alloys Co., The, Elyria, O.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
National-Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, O.-Springfield, O.
Pittsburgh Rolls, Div. of Blaw-Knox Co., Pittsburgh, Pa.
Union Steel Casting Div. of Blaw-Knox Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Brass, Bronze, Copper, Aluminum)

Ampco Metal, Inc., Dept. S-1013, 3830 W. Burnham St., Milwaukee, Wis.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Sumet Corporation, 1553 Fillmore Ave., Buffalo, N. Y.

CASTINGS (Corrosion Resisting)

National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.

CASTINGS (Die)—See DIE CASTINGS

CASTINGS (Electric Steel)

Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
National-Erie Corp., Erie, Pa.
Reading Steel Casting Div. of American Chain & Cable Co. Inc., Reading, Pa.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Gray Iron, Alloy, or Semi-Steel)

American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Brown & Brown, Inc., 456 So. Main St., Lima, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Erie Foundry Co., Erie, Pa.
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Ferracute Machine Co., Bridgeton, N. J.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Oil Well Supply Co., Dallas, Texas.
Shenango-Penn Mold Co., Dover, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

CASTINGS (Heat Resisting)

Electro Alloys Co., The, Elyria, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Malleable)

American Chain & Cable Co. Inc., Bridgeport, Conn.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CASTINGS (Manganese Steel)

Damascus Steel Casting Co., New Brighton, Pa.

CASTINGS (Steel) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehm, Pa.
Birdsboro Stel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Ferracute Machine Co., Bridgeton, N. J.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.-Springfield, O.
Oil Well Supply Co., Dallas, Texas.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
Standard Steel Works Div. of Baldwin Locomotive Works, The Paschall P. O., Philadelphia, Pa.
Steel Founders' Society of America, 920 Midland Bldg., Cleveland, O.
Strong Steel Fdry. Co., Hertel & Norris Ave., Buffalo, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Steel Casting Div. of Blaw-Knox Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Wear Resisting)

Shenango-Penn Mold Co., Dover, O.

CASTINGS (Worm and Gear Bronze)

Ampco Metal, Inc., Dept. S-1013, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.

CEMENT (Acid Proof)

Pennsylvania Salt Mfg. Co., Dept. E., Pennsalt Cleaner Div., Philadelphia, Pa.

CEMENT (High Temperature)

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Eagle-Picher Lead Co., The, Cincinnati, O.
Harbison-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh, Pa.
Johns-Manville Corp., 22 E. 40th St., New York City.
Norton Company, Worcester, Mass.
Quigley Company, 56 W. 45th St., New York City.

CEMENT (High Temperature Hydraulic)

Atlas Lumnite Cement Co., Dept. S-18, Chrysler Bldg., New York City.

CENTRAL STATION EQUIPMENT

Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

CHAIN (Conveyor and Elevator)

Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Draw Bench)

Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Malleable)

Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Power Transmission)

Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Roller)

Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Sling)

American Chain & Cable Co. Inc., Bridgeport, Conn.

CHAIN (Sprocket)

Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Steel-Finished Roller)

Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Welded or Weldless)

American Chain & Cable Co. Inc., Bridgeport, Conn.

CHARGING MACHINES (Cupola)

Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

CHARGING MACHINES (Open Hearth)

Morgan Engineering Co., The, Allince, O.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

CHARGING MACHINES AND MANIPULATORS (Autofloor Type)

Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

CHECKER BRICK

Loftus Engineering Corp., 747 Oliver Bldg., Pittsburgh, Pa.

CHECKS (Metal)

Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

CHEMICALS (Industrial)

American Solder & Flux Co., 2153 E. Norris St., Philadelphia, Pa.

CHISELS (Chipping)

Steel Conversion & Supply Co., P. O. Box 537 (Castle Shannon), Pittsburgh, Pa.

CHROME ORE

Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

CHROMIUM METAL AND ALLOYS

Electro Metallurgical Co., 30 E. 42nd St., New York City.

CHROMIUM PLATING PROCESS

United Chromium, Inc., 51 E. 42nd St., New York City.

WHERE-TO-BUY

CHUCK OPERATING CYLINDERS
Airgrip Chuck Div., Anker-Holth Mfg. Co., Port Huron, Mich.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

CHUCKING MACHINES (Multiple Spindle)
National Acme Co., The, 170 E. 131st St., Cleveland, O.

CHUCKS (Automatic Closing)
Airgrip Chuck Div., Anker-Holth Mfg. Co., Port Huron, Mich.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Jackson, Mich.

CLAMPS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

CLEANERS (Steam)
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.

CLEANING SPECIALTIES
American Chemical Paint Co., Dept. 310, Ambler, Pa.
MacDermid, Inc., Waterbury, Conn.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

CLUTCHES (Friction)
Jones, W. A. Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.

CLUTCHES (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 523 E. Smith St., Milwaukee, Wis.

COAL OR COKE
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Koppers Co., Gas & Coke Div., 300 Koppers Bldg., Pittsburgh, Pa.
Koppers Coal Co., 300 Koppers Bldg., Pittsburgh, Pa.
New England Coal & Coke Co., Boston, Mass.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wieman & Ward Co., The, Oliver Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

COAL, COKE, ORE AND ASH HANDLING MACHINERY
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Koppers Co., Engineering & Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Koppers-Rheolaveur Co., 300 Koppers Bldg., Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

COKE—See COAL OR COKE

COKE OVEN MACHINERY
Alliance Machine Co., The, Alliance, Ohio.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

COKE OVENS (By-Product)
Koppers Co., Engineering and Construction Div., 100 Koppers Bldg., Pittsburgh, Pa.

COLUMBIUM
Electro Metallurgical Co., 30 E. 42nd St., New York City.

COMBUSTION BULBS
Norton Company, Worcester, Mass.

COMBUSTION CONTROLS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Morgan Construction Co., Worcester, Mass.
Norton Company, Worcester, Mass.

COMPARATORS (Optical)
Jones & Lamson Machine Co., Springfield, Vt.

COMPENSATORS (Automatic)
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.

COMPRESSORS (Air)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
General Electric Co., Schenectady, N. Y.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONCRETE (Heat Resistant)
Atlas Lumnite Cement Co., Dept. S-18, Chrysler Bldg., New York City.

CONCRETE REINFORCING BARS —See BARS (Concrete Reinforcing)

CONDENSERS (Surface, Barometric, Multi-Jet)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONDUITS (Electric)
Youngstown Sheet & Tube Co., The, Youngstown, O.

CONDUITS (Pressure-Treated Wood)
Wood Preserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

CONNECTING RODS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

CONTRACTORS—See ENGINEERS AND CONTRACTORS

CONTROL SYSTEMS (Automatic)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

CONTROLLERS (Electric)
Allen-Bradley Co., 1320 So Second St., Milwaukee, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.

CONTROLS (Combustion)—See COMBUSTION CONTROLS

CONTROLS (Temperature)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

CONVEYOR BELTS (High and Low Temperature)
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

CONVEYOR BELTS (Wire)
Cyclone Fence Co., Waukegan, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

CONVEYORS (Apron)
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Chain)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Elevating)
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

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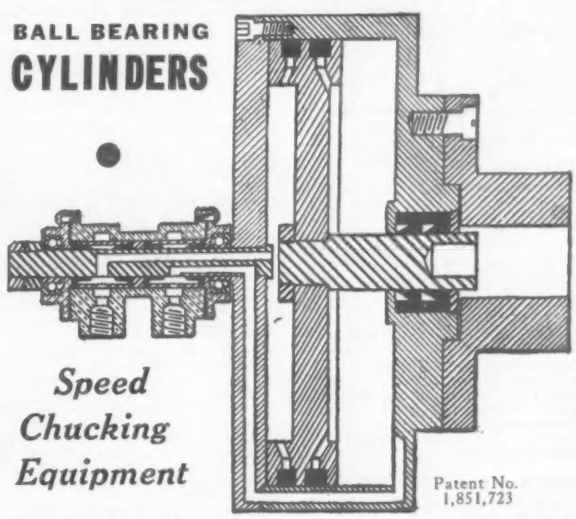

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CONVEYORS (Overhead Trolley)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Reading Chain & Block Corp., Dept. 310, Reading, Pa.

CONVEYORS (Roller—Power and Gravity)
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Vibratory)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

COPPER (Phosphorized)
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

COPPERING COMPOUND
American Chemical Paint Co., Dept. 310, Ambler, Pa.

CORRESPONDENCE COURSES
International Correspondence Schools, Box 9377-B, Scranton, Pa.

COTTER PINS
American Chain & Cable Co., Inc., York, Pa.
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 438 Central Ave., Pontiac, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

COUNTERBORES
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

COUPLINGS (Flexible)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
American Flexible Coupling Co., 18th & Pittsburgh Aves., Erie, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
General Electric Co., Schenectady, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Lovejoy Flexible Coupling Co., 4973 W. Lake St., Chicago, Ill.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.
Poole Fdy. & Mach. Co., Woodberry St., Baltimore, Md.
Waldron, John, Corp., New Brunswick, N. J.

COUPLINGS (Pipe)
Bethlehem Steel Co., Bethlehem, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa
Oil Well Supply Co., Dallas, Texas.
Republic Steel Corp., Dept. ST, Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

CRANES, BRIDGE (Ore and Coal Handling)
Alliance Machine Co., The, Alliance, Ohio.
Dravo Corp. (Engineering Works Div.), Neville Island, Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.

CRANES (Charging)
Alliance Machine Co., The, Alliance, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Crawler, Erection)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Electric)
Alliance Machine Co., The, Alliance, Ohio.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Reading Chain & Block Corp., Dept. 310, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Gantry)
Alliance Machine Co., The, Alliance, Ohio.
Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Reading Chain & Block Corp., Dept. 310, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Gasoline and Diesel)
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CRANES (Hand)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Industrial Brownhoist Corp., Bay City, Mich.
Reading Chain & Block Corp., Dept. 310, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Jib)
Alliance Machine Co., The, Alliance, Ohio.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Reading Chain & Block Corp., Dept. 310, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Locomotive)
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CRANES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div., of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Reading Chain & Block Corp., Dept. 310, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Traveling)
Reading Chain & Block Corp., Dept. 310, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

CRANK SHAFTS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.

CRUSHERS
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.

CUSHIONS (Pneumatic)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

CUT-OFF MACHINES (Abrasive)
Challenge Machinery Co., Grand Haven, Mich.

CUTTERS (Die Sinking & End Milling)
Brown & Sharpe Mfg. Co., Providence, R. I.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Jackson, Mich.

CUTTERS (Gang Slitter)
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.

CUTTING AND WELDING—See WELDING
CUTTING OILS—See OILS (Cutting)

CUTTING-OFF MACHINES (Rotary)
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Taylor-Wilson Mfg. Co., 15 Thomson Ave., McKees Rocks, Pa.

CYLINDERS (Air or Hydraulic)
Airgrip Chuck Div., Anker-Holth Mfg. Co., Port Huron, Mich.
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Jackson, Mich.

CYLINDERS (Hydraulic)
American Hollow Boring Co., 1054 W. 20th St., Buffalo, N. Y.

CYLINDERS (Pressure)
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

DEGREASERS
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

DEOXIDIZERS
Vanadium Corp. of America, 420 Lexington Ave., New York City.

DESCALING PROCESSES
The Bullard Co., Bridgeport, Conn.

DESIGNERS (Industrial)
Designers for Industry, Inc. Terminal Tower, Cleveland, O.

DIE BLOCKS
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.
Ampco Metal, Inc., Dept. S-1013, 3830 W. Burnham St., Milwaukee, Wis.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

DIE CENTERS
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

DIE CUSHIONS
Dayton Rogers Co., Dept. "C." 2830-13th Ave., So., Minneapolis, Minn.

DIE HEADS
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

DIE-SINKING MACHINES
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.

DIES (Cast)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.

DIES (Punching, Stamping, Blanking)
Columbus Die, Tool & Mach. Co. 955 Cleveland Ave., Columbus, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

DIES (Steel, Embossing)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

DOLOMITE—FLUX AND REFRACTORIES
Basic Refractories, Inc., Hanna Bldg., Cleveland, O.

DOORS & SHUTTERS (Steel, Fire, and Rolling)
Kinnear Mfg. Co., 1780-1800 Fields Ave., Columbus, O.

DRAFT GAGES (Indicating, Recording)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Peabody Engineering Corp., 580 Fifth Ave., New York City.

DRAGLINES (Crawler)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

DRAW BENCHES
Vaughn Machinery Co., Cuyahoga Falls, O.

DRILL HEADS (Multiple)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

DRILL RODS—See RODS (Drill)

DRILLING MACHINERY
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.

DRILLING MACHINES (Radial)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

DRILLING MACHINES (Vertical)
Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.

DRILLS (Twist)—See TWIST DRILLS

DRIVES (Chain)
Link-Belt Co., 220 S. Belmont Ave Indianapolis, Ind.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

DRIVES (Cut Herringbone Gear)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

DRIVES (Multi-V-Belt)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

DRIVES (Reciprocating)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

DRUMS (Steel)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

DRYERS (Compressed Air)
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee, Wis.

DRYERS (Rotary)
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

DUST ARRESTING EQUIPMENT
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Pangborn Corp., Hagerstown, Md.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee, Wis.

ECONOMIC SERVICE
Brookmire Corp., 551 Fifth Ave., New York City.

ECONOMIZERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

ELECTRIC WELDING—See WELDING

ELECTRIC WIRING—See WIRE AND CABLE

ELECTRICAL EQUIPMENT
Allen-Bradley Co., 1320 So. Second St., Milwaukee, Wis.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.
Fairbanks, Morse & Co., Dept. J75, 600 S. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.

ELECTRODES (Carbon and Graphite)
National Carbon Co., W. 117th St. at Madison Ave., Cleveland, O.

ELECTRODES (Hard Surfacing Welding)
Stoody Co., Whittier, Calif.

ELEVATING AND CONVEYING MACHINERY—See CONVEYORS

ENGINEERS AND CONTRACTORS
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
C. H. Hunt, 1213 First National Bank Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

ENGINEERS (Consulting)
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
C. H. Hunt, 1213 First National Bank Bldg., Pittsburgh, Pa.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Loftus Engineering Corp., 747 Oliver Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Wean Engineering Co., Warren, O.

ENGINEERS (Lubricating Equipment)
Lincoln Engineering Co., 5700 Natural Bridge Ave., St. Louis, Mo.

ENGINES (Diesel)
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Fairbanks, Morse & Co., Dept. J75, 600 So. Michigan Ave., Chicago, Ill.

ENGINES (Gas, Oil)
Fairbanks, Morse & Co., Dept. J75, 600 So. Michigan Ave., Chicago, Ill.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES (Kerosene)
Fairbanks, Morse & Co., Dept. J75, 600 S. Michigan Ave., Chicago, Ill.

ENGINES (Steam)
Oil Well Supply Co., Dallas, Texas.

EXCAVATORS
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

FANS (Crane Cab)
Perkins, B. F. & Son, Inc., Holyoke, Mass.

FANS (Exhaust Ventilating)
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

FANS (Portable)
Perkins, B. F., & Son, Inc., Holyoke, Mass.

FANS (Wall)
Perkins, B. F. & Son, Inc., Holyoke, Mass.

FENCE (Chain Link)
Cyclone Fence Co., Waukegan, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.

FENCING (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

FERROALLOY (Briquets)
Electro Metallurgical Co., 30 E. 42nd St., New York City.

FERROALLOYS
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
Electro Metallurgical Co., 30 E. 42nd St., New York City.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROCHROME
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROMANGANESE
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROPHOSPHORUS
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROSILICON
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Southern Ferro Alloys Co., 2108 Chestnut St., Chattanooga, Tenn.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROSILICON ALUMINUM
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROTITANIUM
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROVANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave.,

FILES AND RASPS
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.

FILTER CLOTH (Asbestos)
Johns-Manville Corp., 22 E. 40th St., New York City.

FIRE EXTINGUISHERS
C-O-Two Fire Equipment Co., 10 Empire St., Newark, N. J.
Kidde, Walter, & Co., Inc., 732 West St., Bloomfield, N. J.

FIRE CLAY—See REFRACTORIES

FIRE DOORS & SHUTTERS—See DOORS & SHUTTERS

FITTINGS (Electric Steel)
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

FLAME HARDENING
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., 30 E. 42nd St., New York City.
National-Erie Corp., Erie, Pa.

FLANGES (Welded Steel)
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.

FLOORING (Monolithic)
Johns-Manville Corp., 22 E. 40th St., New York City.

FLOORING (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Blaw-Knox Co., Blawnox, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

FLUE DUST CONDITIONERS
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

FLUE GAS ANALYZERS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

FLUORSPAR
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FLUXES (Soldering, Welding & Tinning)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
American Solder & Flux Co., 2153 E. Norris St., Philadelphia, Pa.
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

FORGING BILLETS—See BILLETS

FORGING MACHINERY
Alliance Machine Co., The, Alliance, Ohio.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.

FORGINGS (Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-1013, 3630 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

FORGINGS (Drop) (*Also Stainless)
*Atlas Drop Forge Co., Lansing, Mich.
*Bethlehem Steel Co., Bethlehem, Pa.
Oil Well Supply Co., Dallas, Texas.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Hollow Bored)
American Hollow Boring Co., 1054 W. 20th St., Erie, Pa.
Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.

FORGINGS (Iron and Steel) (*Also Stainless)
*Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Oil Well Supply Co., Dallas, Texas.
Standard Steel Works Div. of The Baldwin Locomotive Works, Paschall P. O., Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Upset)
Atlas Drop Forge Co., Lansing, Mich.
Bethlehem Steel Co., Bethlehem, Pa.

FROGS AND SWITCHES
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.

FURNACE INSULATION—See INSULATION

FURNACES (Blast)
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

FURNACES (Brazing)
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Upton Electric Salt Bath Furnace Div. Commerce Pattern Fdry. & Mach. Co., 7452 Melville Ave., at Green, Detroit, Mich.

FURNACES (Electric Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

FURNACES (Electric Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
General Electric Co., Schenectady, N. Y.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Forging)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wilson, Lee, Sales Corp., 1370 Blount St., Cleveland, O.

FURNACES (Galvanizing)
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Wilson, Lee, Sales Corp., 1370 Blount St., Cleveland, O.

FURNACES (Gas or Oil)
Electric Furnace Co., The, Salem, O.

FURNACES (Gas or Oil)—Con.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wilson, Lee, Sales Corp., 1368 Blount St., Cleveland, O.

FURNACES (Heat Treating, Annealing, Carburizing, Hardening, Tempering)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Gas Furnace Co., Elizabeth, N. J.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Carborundum Co., The, Perth Amboy, N. J.
Despatch Oven Co., 922 Ninth St., S.E., Minneapolis, Minn.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
A. F. Holden Co., The, 200 Winchester Ave., New Haven, Conn.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Ohio Crankshaft Co., The, 6600 Clement Ave., Cleveland, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Swindell-Dressier Corp., P. O. Box 1888, Pittsburgh, Pa.
Upton Electric Salt Bath Furnace Div. Commerce Pattern Fdry. & Mach. Co., 7452 Melville Ave., at Green, Detroit, Mich.
Wean Engineering Co., Warren, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.
Wilson, Lee, Sales Corp., 1370 Blount St., Cleveland, O.

FURNACES (Laboratory)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Non-Ferrous Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Wilson, Lee, Sales Corp., 1370 Blount St., Cleveland, O.

FURNACES (Open Hearth)
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

FURNACES (Recuperative)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J. Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Rivet Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Sheet and Tin Mill)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

FURNACES (Steel Mill)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Swindell-Dressier Corp., P. O. Box 1888, Pittsburgh, Pa.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

GAGE BLOCKS
Dearborn Gage Co., 22036 Beech St., Dearborn, Mich.

GAGES
Brown & Sharpe Mfg. Co., Providence, R. I.
Greenfield Tap & Die Corp., Greenfield, Mass.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.
Sheffield Corp., The, Gage Div., Dayton, O.

GAGES (Automatic Control & Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.

GAGES (Indicating and Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
General Electric Co., Schenectady, N. Y.
Sheffield Corp., The, Gage Div., Dayton, O.

GAGES (Pressure & Vacuum Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.

GALVANIZING (Hot Dip)
Acme Galvanizing, Inc., Milwaukee, Wis.
Acme Steel & Malleable Iron Works, Buffalo, N. Y.
American Hot Dip Galvanizers Assoc., Inc., 903 American Bank Bldg., Pittsburgh, Pa.
American Tinning & Galvanizing Co., Erie, Pa.
Atlantic Steel Co., Atlanta, Ga.
Buffalo Galvanizing & Tinning Works, Inc., Buffalo, N. Y.
Cattie, Jos. P., & Bros., Gaul and Liberty Sts., Philadelphia, Pa.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Enterprise Galvanizing Co., 2507 E. Cumberland St., Philadelphia, Pa.
Equipment Steel Products Div., of Union Asbestos & Rubber Co., Blue Island, Ill.
Galvanizers Incorporated, Portland, Ore.
Fanner Mfg. Co., The, Cleveland, O.
Finn, John, Metal Works, San Francisco, Calif.
Gregory, Thomas, Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh, Pa.
Hill, James, Mfg. Co., Providence, R. I.
Hubbard & Co., Oakland, Calif.
Independent Galvanizing Co., Newark, N. J.
International-Stacey Corp., Columbus, O.
Isaacson Iron Works, Seattle, Wash.
Joslyn Co. of California, Los Angeles, Calif.
Joslyn Mfg. & Supply Co., Chicago, Ill.
Koven, L. O., & Bro., Inc., Jersey City, N. J.
Lehigh Structural Steel Co., Allentown, Pa.
Lewis Bolt & Nut Co., Minneapolis, Minn.
Missouri Rolling Mill Corp., St. Louis, Mo.
National Telephone Supply Co., The, Cleveland, O.
Penn Galvanizing Co., Philadelphia, Pa.
Riverside Foundry & Galvanizing Co., Kalamazoo, Mich.
San Francisco Galvanizing Works, San Francisco, Calif.
Sanitary Tinning Co., The, Cleveland, O.
Standard Galvanizing Co., Chicago, Ill.
Wilcox, Crittenden & Co., Inc., Middletown, Conn.
Witt Cornice Co., The, Cincinnati, O.

GALVANIZING COMPOUNDS
American Solder & Flux Co., 2153 E. Norris St., Philadelphia, Pa.

GALVANIZING PLANTS FOR SHEETS
Erie Foundry Co., Erie, Pa.
Wean Engineering Co., Warren, O.

GALVANIZING PRODUCTS
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.

GAS HOLDERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GAS PRODUCER PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

GAS RECOVERY COKE OVEN AND GAS PLANTS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

GAS SCRUBBERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GASKETS (Asbestos, Metal or Rubber)
Johns-Manville Corp., 22 E. 40th St., New York City.

GEAR BLANKS
Ampco Metal, Inc., Dept. S-1013, 3830 W. Burnham St., Milwaukee, Wis.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEAR MACHINERY (Generating)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

GEAR MACHINERY (Lapping, Finishing, Checking)
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

GEARS (Non-Metallic)
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

GEARS (Steel Laminated)
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEARS (Worm)
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

GEARS AND GEAR CUTTING
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
General Electric Co., Schenectady, N. Y.
Grant Gear Works, 2nd & B Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1467 Pittsburgh, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
National-Erie Corp., Erie, Pa.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., 25th St., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

GENERATING SETS
Fairbanks, Morse & Co., Dept. J75, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

GENERATORS (Acetylene—Portable and Stationary)
Linde Air Products Co., The, 30 E. 42nd St., New York City.

GENERATORS (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks, Morse & Co., Dept. J75, 600 S. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

GENERATORS (Plating)
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

GRABS—FOR SHEETS, COILS, INGOTS
J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

GRATING
Blaw-Knox Co., Blawnox, Pa.
Dravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

GREASE FITTINGS
Lincoln Engineering Co., 5700 Natural Bridge Ave., St. Louis, Mo.

GREASE GUNS
Lincoln Engineering Co., 5700 Natural Bridge Ave., St. Louis, Mo.

GREASE (Lubricating)—See LUBRICANTS (Industrial)

GREASE RETAINERS AND SEALS
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Michigan Leather Packing Co., 6313 E. Lafayette Ave., Detroit, Mich.

GRINDER CENTERS
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

GRINDERS (Circular Saw)
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.

GRINDERS (Foundry Core)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

GRINDERS (Precision Thread)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Jones & Lamson Machine Co., Springfield, Vt.

GRINDERS (Single Slide Internal)
Bryant Chucking Grinder Co., Springfield, Vt.

GRINDERS (Surface)
Brown & Sharpe Mfg. Co., Providence, R. I.
Heald Machine Co., Worcester, Mass.
Norton Company, Worcester, Mass.

GRINDERS (Swing Frame)
Fox Grinders, Inc., Oliver Bldg., Pittsburgh, Pa.

GRINDING (Shear Knife)
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

WHERE-TO-BUY

GRINDING COMPOUNDS
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

GRINDING MACHINES (Automotive Reconditioning)
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Centerless, Internal and External)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Chucking)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Crank Pin, Cam, Piston & Valve Face)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Norton Company, Worcester, Mass.

GRINDING MACHINES (Oscillating)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.

GRINDING MACHINES (Plain and Universal)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Roll)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Rotary Surface)
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Segmental)
Norton Company, Worcester, Mass.

GRINDING MACHINES (Tool and Cutter)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
Norton Co., Worcester, Mass.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

GRINDING MACHINES (Swing Frame)
Excelsior Tool & Machine Co., Ridge & Jefferson Aves., E. St. Louis, Ill.

GRINDING WHEELS
Bay State Abrasive Products Co., Westboro, Mass.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Macklin Co., The, Jackson, Mich.
Norton Co., Worcester, Mass.

GRINDING WHEELS (Segmental)
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Company, Worcester, Mass.

GUARDS (Belt, Machine & Window)
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.

GUIDE SHOES
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

GUIDES (Mill)
Ampco Metal, Inc., Dept. S-1013, 3830 W. Burnham St., Milwaukee, Wis.
National-Erie Corp., Erie, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

GUNS (Blast Furnace Mud)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

GUNS (Steam, Hydraulic, Electric)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

HAMMER BUSHINGS
Steel Conversion & Supply Co., P. O. Box 537 (Castle Shannon), Pittsburgh, Pa.

HAMMERS (Drop)
Alliance Machine Co., The, Alliance, Ohio.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HAMMERS (Power)
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

HAMMERS (Steam)
Alliance Machine Co., The, Alliance, Ohio.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HANGERS
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HANGERS (Shaft)
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Sales Corp., Harrison, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HEADING MACHINERY
National Machinery Co., Tiffin, O.

HEATERS (Air)
Airtherm Manufacturing Co., 726 S. Spring Ave., St. Louis, Mo.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

HEATERS (Electric Space)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

HEATERS (Unit)
Airtherm Manufacturing Co., 726 S. Spring Ave., St. Louis, Mo.
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Grinnell Co., Inc., Providence, R. I.

HELMETS (Blast Cleaning)
Pangborn Corp., Hagerstown, Md.

HITCHINGS (Mine Car)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOBS
Brown & Sharpe Mfg. Co., Providence, R. I.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

HOISTS (Chain)
Cleveland Tramrail Div., of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Ford Chain Block Div. of American Chain & Cable Co., Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Reading Chain & Block Co., Dept. 310, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Electric)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Reading Chain & Block Corp., Dept. 310, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

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ROARING MACHINES . . . Bang Bang of hammers . . . Screech of cutting tools . . . Splash of parts in lacquer dip-tanks . . . Foremen moving here and there. And in every movement you see industry at work. The orderly routing of planned production. Suddenly a burst of flame. Fire crews rush to stations. The long wait for the siren and the bell. The long wait mopping up afterwards. But why the necessity of all this waiting?

IT'S SAFER *because* IT'S FASTER

C-O-TWO will smother a fire in a matter of seconds with carbon dioxide gas expelled from the nozzle at a temperature of 110 degrees below zero—without damage. No mopping up after fire axes and water deluge. Progressive factories know the reliability of C-O-TWO. It means avoiding costly delays and shutdowns caused by fires. There is C-O-TWO* equipment to protect your plant against fire. Write today for full details on portables, hose units and systems.

C-O-TWO Wheeled Portable
U. S. Navy type, two 20 lb. cylinders arranged for separate release of carbon dioxide from either cylinder—25 ft. length of hose.

**C-O-TWO is the registered trade mark and trade name of the carbon dioxide fire extinguishing equipment manufactured by the C-O-TWO Fire Equipment Company, Newark, New Jersey.*

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Sales and Service in the Principal Cities of United States C-O-TWO *and Canada*

HOISTS (Electric)—Con.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Monorail)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reading Chain & Block Corp., Dept. 310, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Pneumatic)
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.

HONING MACHINES
Micromatic Hone Co., 1345 E. Milwaukee Ave., Detroit, Mich.

HOOKS (Chain)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOOPS AND BANDS
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

HOOPS (Welded Wire)
Keystone Steel & Wire Co., Peoria, Ill.

HOSE (Flexible Metal)
American Metal Hose Branch of The American Brass Co., Waterbury, Conn.

HUMIDIFIERS (Industrial)
Grinnell Co., Inc., Providence, R. I.

HYDRAULIC MACHINERY
Alliance Machine Co., The, Alliance, Ohio.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bethlehem Steel Cp., Bethlehem, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

HYDRAULIC PRESSES—See PRESSES (Hydraulic)

HYDRAULIC UNITS
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

INDICATORS (Blast Furnace Stock Line)
Broslus, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

INDICATORS (Temperature)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

INDUSTRIAL DESIGNERS
Designers for Industry, Inc., Terminal Tower, Cleveland, O.

INGOT MOLDS
Bethlehem Steel Co., Bethlehem, Pa.
Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh, Pa.
Superior Mold & Iron Co., Penn, Pa.
Valley Mould & Iron Corp., Hubbard, O.

INHIBITORS
American Chemical Paint Co., Dept. 310, Ambler, Pa.

INSTRUMENTS (Electric-Indicating and Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Brush Development Co., 3311 Perkins Ave., Cleveland, O.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
General Electric Co., Schenectady, N. Y.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

INSULATING BLOCK
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Eagle-Picher Lead Co., The, Cincinnati, O.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATING BRICK
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Quigley Co., 56 W. 45th St., New York City.

INSULATING CONCRETE
Atlas Lumnite Cement Co., Dept. S-18, Chrysler Bldg., New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATING POWDER AND CEMENT
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Eagle-Picher Lead Co., The, Cincinnati, O.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATION (Building)
Eagle-Picher Lead Co., The, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATION (Furnace, Boiler Settings, Ovens, Steam Pipe, Etc.)
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Eagle-Picher Lead Co., The, Cincinnati, O.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Quigley Co., 56 W. 45th St., New York City.

IRON (Bar)
Ryerson, Jos. T., & Son Co., 16th & Rockwell Sts., Chicago, Ill.

IRON ORE
Alan Wood Steel Co., Conshohocken, Pa.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The Youngstown, O.

JIG BORERS
Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.

JIGS AND FIXTURES
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

KEYS (Machine or Woodruff)
Moltrup Steel Products Co., Beaver Falls, Pa.

KILNS (Rotary Sintering)
Smidth, F. L., & Co., 60 E. 42nd St., New York, N. Y.

KNIVES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

LABORATORY WARE
Bay State Abrasive Products Co., Westboro, Mass.
Norton Company, Worcester, Mass.

LAMPS (Industrial)
General Electric Co., Dept. 166-S-G, Nela Park, Cleveland, O.

LAPPING MACHINES
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
Norton Company, Worcester, Mass.

LAPPING PLATES
Challenge Machinery Co., Grand Haven, Mich.

LARRIES (Coal)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.

LATHE CENTERS
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

LATHE DOGS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

LATHES
Axelson Manufacturing Co., 6160 So. Boyle Ave., Los Angeles, Cal.
Jones & Lamson Machine Co., Springfield, Vt.
LeBlond, R. K., Machine Tool Co., Dept. J-2, Cincinnati, O.
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, 894 E. Madison St., South Bend, Ind.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Automatic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
Monarch Machine Tool Co., Sidney, O.

LATHES (Chucking)
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

LATHES (Engine)
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, 894 E. Madison St., South Bend, Ind.

LATHES (Roll Turning)
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Turret)
Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Company, The, Bridgeport, Conn.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LAYOUT SURFACE PLATES
Challenge Machinery Co., Grand Haven, Mich.

LEAD (Tellurium)
National Lead Co., 111 Broadway, New York City.

LEVELING MACHINES
Erie Foundry Co., Erie, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
McKay Machine Co., Youngstown, O.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

LIFT TRUCKS—See TRUCKS (Lift)

LIFTING MAGNETS—See MAGNETS (Lifting)

LIGHTING (Industrial)
General Electric Co., Dept. 166-S-G, Nela Park, Cleveland, O.

LINERS (Pump and Cylinder)
Shenango-Penn Mold Co., Dover, O.

LOCOMOTIVE CRANES—See CRANES (Locomotive)

LOCOMOTIVES (Diesel-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Differential Steel Car Co., Findlay, O.
Plymouth Locomotive Works, Div., Fate-Root-Heath Co., Plymouth, O.
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Diesel Mechanical)
Plymouth Locomotive Works, Div., Fate-Root-Heath Co., Plymouth, O.
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Electric)
Porter, H. K., Co. Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Electric Trolley)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Fireless)
Porter, H. K., Co. Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Gasoline-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Gasoline Mechanical)
Differential Steel Car Co., Findlay, O.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Oil-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.

LOCOMOTIVES (Steam)
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Storage Battery)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Switching and Transfer)
Cooper-Bessemer Corp., The, Mt. Vernon, O.

LUBRICANTS (Industrial)
American Lanolin Corp., Railroad St., Lawrence, Mass.

WHERE-TO-BUY

LUBRICANTS (Industrial)—Con.
Gulf Oil Corp. of Penna., Gulf Refining Co., 3800 Gulf Bldg., Pittsburgh, Pa.
New York & New Jersey Lubricant Co., 292 Madison Ave., New York City.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

LUBRICATING SYSTEMS
Farval Corp., The, 3270 E. 80th St., Cleveland, O.
Lincoln Engineering Co., 5700 Natural Bridge Ave., St. Louis, Mo.

MACHINE WORK
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.

MACHINERY (Special)
Alliance Machine Co., The, Alliance, Ohio.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hanniffin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
National-Erie Corp., Erie, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Oil Well Supply Co., Dallas, Texas.
Shuster, F. B., Co., The, New Haven, Conn.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

MACHINERY (Used & Rebuilt)
Albert, L., & Son, Whitehead Rd., Trenton, N. J.
Crawbuck, John D., Co., Empire Bldg., Pittsburgh, Pa.
Galbreath Machinery Co., Empire Bldg., Pittsburgh, Pa.
General Blower Co., 404 No. Peoria St., Chicago, Ill.
Iron & Steel Products, Inc., Hegewisch Sta., Chicago, Ill.
Lang Machinery Co., 28th & A.V.R.R., Pittsburgh, Pa.
Motor Repair & Mfg. Co., 1558 Hamilton Ave., Cleveland, O.
Philadelphia Transformer Co., 2829 Cedar St., Philadelphia, Pa.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

MAGNESIA (Electrically Fused)
Norton Co., Worcester, Mass.

MAGNETIC SEPARATORS—See SEPARATORS (Magnetic)

MAGNETS (Lifting)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 523 E. Smith St., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2670 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MAGNETS (Separating)
Dings Magnetic Separator Co., 523 E. Smith St., Milwaukee, Wis.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MANDRELS (Expanding)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

MANGANESE METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

MANGANESE ORE
Cuban-American Manganese Corp., 122 E. 42nd St., New York, N. Y.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

MANIPULATORS
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

MANIPULATORS (Forging)
Alliance Machine Co., The, Alliance, Ohio.

MARKING DEVICES
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

METAL (Perforated)—See PERFORATED METAL

METAL BLAST ABRASIVES (Shot and Grit)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 4839 Harrison St., Pittsburgh, Pa

METAL CLEANERS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Pennsylvania Salt Mfg. Co., Dept. E Pennsalt Cleaner Div., Philadelphia, Pa.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

METAL FINISHES
American Nickeloid Co., 1310 N. Second St., Peru, Ill.

METAL SPECIALTIES AND PARTS—See STAMPINGS

METAL STAMPINGS—See STAMPINGS

METALS (Hard Surfacing)
Stoody Co., Whittier, Calif.

METALS (Nonferrous)
American Brass Co., The, Waterbury, Conn.
International Nickel Co., Inc., The, 67 Wall St., New York City.

MICROMETERS
Brown & Sharpe Mfg. Co., Providence, R. I.

MILLING CUTTERS
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

MILLING MACHINES
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

MILLING MACHINES (Milling and Centering Combined)
Jones & Lamson Machine Co., Springfield, Vt.

MILLS (Blooming, Universal, Plate, Sheet, Tin, Bar, Strip, Etc.)—See ROLLING MILL EQUIPMENT

MOLDING MACHINERY (Foundry)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

MOLDS (Ingot)—See INGOT MOLDS

MOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

MONEL METAL (All Commercial Forms)
International Nickel Co., Inc., The, 67 Wall St., New York City.

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Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Reading Chain & Block Corp., Dept. 310, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

MOTOR-ROLLERS
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

MOTORS (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks, Morse & Co., Dept. J75, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

MUCK BAR
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

NAILS (*Also Stainless)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

NAILS (Coated and Galvanized)
Wickwire Brothers, 189 Main St., Cortland, N. Y.

NICKEL (All Commercial Forms)
International Nickel Co., Inc., The, 67 Wall St., New York City.

NICKEL (Shot)
International Nickel Co., Inc., The, 67 Wall St., New York City

NICKEL STEEL (Cold Drawn)
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Republic Steel Co., Dept. ST Cleveland, O.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.

NOZZLES (Blasting)
Pangborn Corporation, Hagerstown, Md.

NUTS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Elastic Stop Nut Corp., 2367 Vauxhall Rd., Union, N. J.
Erie Bolt & Nut Co., Liberty Ave., at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y
Tinnerman Products, Inc., 2039 Fulton Rd., Cleveland, O.

NUTS (Castellated)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave., at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Machine Screw)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.

NUTS (Non-Ferrous and Stainless)
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

NUTS (Self Locking)
Elastic Stop Nut Corp., 2367 Vauxhall Rd., Union, N. J.

NUTS (Semi-Finished)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Wing)
Central Screw Company 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

OIL RETAINERS AND SEALS
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Michigan Leather Packing Co., 6313 E. Lafayette Ave., Detroit, Mich.

OILS (Cutting)
Gulf Oil Corp. of Penna., Gulf Refining Co., 3800 Gulf Bldg., Pittsburgh, Pa.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

OILS (Lubricating)—See LUBRICANTS (Industrial)

OILS (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

OPEN-HEARTH FURNACES—See FURNACES (Open-Hearth)

OVENS (Annealing, Japanning, Tempering)
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.

OVENS (Coke, By-Product Recovery)
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

OVENS (Core and Mold)
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

OXY-ACETYLENE WELDING AND CUTTING—See WELDING

OXYGEN IN CYLINDERS
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City

PACKING (Asbestos or Rubber)
Johns-Manville Corp., 22 E. 40th St., New York City.

PACKINGS—MECHANICAL LEATHER (Cup, U-Cup, Flange and Vees)
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Michigan Leather Packing Co., 6313 E. Lafayette Ave., Detroit, Mich.

PAINT (Alkali Resisting)
Pennsylvania Salt Mfg. Co., Dept. E. Pennsalt Cleaner Div., Philadelphia, Pa.

PAINT (Aluminum)
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PAINT (Heat Resisting)
American Chemical Paint Co., Dept. 310, Ambler, Pa.

PAINT (Marking)
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PAINT (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PARALLELS
Challenge Machinery Co., Grand Haven, Mich.

PARTS (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PATTERN EQUIPMENT (Wood or Metal)
Wellman Bronze & Aluminum Co., The, 6002 Superior Ave., Cleveland, O.

PERFORATED METAL
Chicago Perforating Co., 2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

PHENOL RECOVERY PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

PICKLING COMPOUNDS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Pennsylvania Salt Mfg. Co., Dept. E. Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING CRATES
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.

PICKLING EQUIPMENT
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.
International Nickel Co., The, 67 Wall St., New York City.

PICKLING MACHINERY
Erie Foundry Co., Erie, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

PICKLING TANK LININGS
Ceilcote Co., 750 Rockefeller Bldg., Cleveland, O.
Pennsylvania Salt Mfg. Co., Dept. E. Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING TANKS—See TANKS (Pickling)

PIERCER POINTS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIG IRON
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Jackson Iron & Steel Co., Jackson, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wieman & Ward Co., The, Oliver Bldg., Pittsburgh, Pa.

PIG IRON (Charcoal)
Tennessee Products Corp., Nashville, Tenn.

PILING (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 South Dearborn St., Chicago, Ill.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.

PILING (Pressure-Treated Wood)
Wood Preserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

PILLOW BLOCKS (Ball)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.

PILLOW BLOCKS (Roller Bearing)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.

PILLOW BOXES
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

PINIONS (Mill)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
United Engineering & Foundry Co. First National Bank Bldg., Pittsburgh, Pa.

PINS (Case Hardened or Heat Treated)
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.

PINS (Taper)
Moltrup Steel Products Co., Beaver Falls, Pa.

PIPE (Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Shenango-Penn Mold Co., Dover, O.

PIPE (Square and Rectangular)
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE (Steel)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST. Cleveland, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE BALLS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIPE BENDING
Crane Co., 836 So. Michigan Ave., Chicago, Ill.

PIPE CUTTING AND THREADING MACHINERY
Landis Machine Co., Waynesboro, Pa.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

PIPE FITTINGS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
Oil Well Supply Co., Dallas, Texas.
Worthington Pump & Machinery Corp., Harrison, N. J.

PIPE LINES (Riveted and Welded)
Bethlehem Steel Co., Bethlehem, Pa.

WHERE-TO-BUY

PIPE MILL MACHINERY
Taylor-Wilson Mfg. Co., 15 Thompson Ave., McKees Rocks, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

PIPE ROLLS (Magnetic)
Dings Magnetic Separator Co., 523 E. Smith St., Milwaukee, Wis.

PIPE STRAIGHTENING MACHINERY
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Taylor-Wilson Mfg. Co., 15 Thompson Ave., McKees Rocks, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

PIPING CONTRACTORS
Grinnell Co., Inc., Providence, R. I.
Power Piping Co., Beaver and Western Ave., Pittsburgh, Pa.

PISTON RINGS
American Hammered Piston Ring Div., Koppers Co., Baltimore, Md.

PISTON RODS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Union Drawn Steel Div., Republic Steel Corp., Massillon, O.

PLANERS AND SHAPERS
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

PLANT DISMANTLERS
Hetz Construction Co., Warren, O.

PLATE CASTORS
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.

PLATES (Sheared or Universal) (*Also Stainless)
*Alan Wood Steel Co., Conshohocken, Pa.
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
*Bethlehem Steel Co., Bethlehem, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PLATES (Stainless Clad)
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.

PLATES (Steel—Floor)—See FLOORING (Steel)

PLATES (Terne and Tin)—See TIN PLATE

PLATING EQUIPMENT
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

PLUGS (Expansion)
Hubbard, M. D., Spring Co., 438 Central Ave., Pontiac, Mich.

PLUGS (Rolling Mill)
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

POLES (Tubular Steel)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

POLISHING MACHINERY (Tube and Bar)
Medart Co., The, 3520 de Kalb St., St. Louis, Mo.

POTENTIOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn

POTS (Case Hardening)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

POTS (Melting)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md

POWER UNITS (Gasoline, Electric for Industrial Trucks)
Ready-Power Co., The, 3828 Grand River Ave., Detroit, Mich.

PREHEATERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St. New York City.

PRESSED METAL PARTS
Stanley Works, The, Pressed Metal Div., New Britain, Conn.

PRESSES
Pliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Jackson, Mich.
Waterbury Farrell Foundry & Machine Co., Waterbury, Conn.
Watson-Stillman Co., Roselle, N. J

PRESSES (Bending)
Cleveland Crane & Engineering Co., Steelweld Machinery Div., The 1125 E. 283rd St., Wickliffe, O.
Watson-Stillman Co., Roselle, N. J
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Extrusion)
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J
Wood, R. D., Co., 400 Chestnut St. Philadelphia, Pa.

PRESSES (Forging)
Erie Foundry Co., Erie, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.

PRESSES (Forming and Braking)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., 1125 E. 283rd St., Wickliffe, O.
Watson-Stillman Co., Roselle, N. J.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

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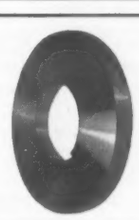
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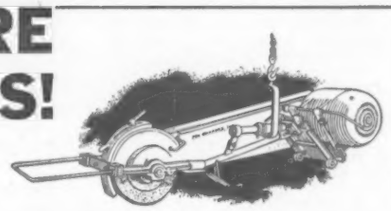
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Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PRESSES (Pneumatic)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Punching, Drawing, Coining, Blanking, etc.)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Riveting)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Scrap Bundling and Baling)
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

PRESSES (Stamping)
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Welding)—See WELDERS

PRESSES, BRIQUETING (Turnings & Borings)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

PRESSURE VESSELS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

PRODUCER GAS SYSTEMS—See GAS PRODUCER PLANTS

PUG MILLS (For Blast Furnaces and Sintering Plants)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.

PULLEYS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 523 E. Smith St., Milwaukee, Wis.

PULVERIZERS
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.

PUMP HOUSES
Dravo Corp. (Contracting Div.), Neville Island, Pittsburgh, Pa.

PUMPS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Fairbanks, Morse & Co., Dept. J75, 600 S. Michigan Ave., Chicago, Ill.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Roper, The Geo. D., Corp., Rockford, Ill.
Weinman Pump & Suply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Boiler Feed)
Fairbanks, Morse & Co., Dept. J75, 600 S. Michigan Ave., Chicago, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Centrifugal)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks, Morse & Co., Dept. J75, 600 So. Michigan Ave., Chicago, Ill.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Jackson, Mich.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Fuel Injection)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PUMPS (Hydraulic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
National-Erie Corp., Erie, Pa.
Roper, The Geo. D., Corp., Rockford, Ill.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PUMPS (Reciprocating)
Fairbanks, Morse & Co., Dept. J75, 600 S. Michigan Ave., Chicago, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Rotary)
Brown & Sharpe Mfg. Co.,
Fairbanks, Morse & Co., Dept. J75, Providence, R. I. 600 S. Michigan Ave., Chicago, Ill.
Roper, The Geo. D., Corp., Rockford, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Vacuum)
Fairbanks, Morse & Co., Dept. J75, 600 S. Michigan Ave., Chicago, Ill.

PUMPS (Vertical Turbine)
Layne & Bowler, Inc., Memphis, Tenn.

PUNCHES (Multiple)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PUNCHING AND SHEARING MACHINERY
Beatty Machine & Mfg. Co., Hammond, Ind.
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Waterbury Farrell Foundry & Machine Co., Waterbury, Conn.

PYROMETER TUBES
Norton Company, Worcester, Mass.

PYROMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

RAIL BREAKERS
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

RAILS (New and Relaying)
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.

RAILS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

REAMERS
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.

REBUILT EQUIPMENT
Albert, L., & Son, Whitehead Rd., Trenton, N. J.
Crawbuck, John D., Co., Empire Bldg., Pittsburgh, Pa.
Galbreath Machinery Co., Empire Bldg., Pittsburgh, Pa.
General Blower Co., 404 N. Peoria St., Chicago, Ill.
Iron & Steel Products, Inc., Hegewisch Sta., Chicago, Ill.
Lang Machinery Co., 28th & A.V.R.R., Pittsburgh, Pa.
Motor Repair & Mfg. Co., 1558 Hamilton Ave., Cleveland, O.
Philadelphia Transformer Co., 2829 Cedar St., Philadelphia, Pa.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

RECEIVERS
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

RECORDERS (Combustion)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

RECORDERS (Pressure, Speed, Temperature, Time)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

REDUCERS (Speed)—See SPEED REDUCERS

REDUCTION GEARS
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Sturtevant, B. F., Co. Hyde Park, Boston, Mass.

REFRACTORIES (Dolomite)
Basic Refractories, Inc., Hanna Bldg., Cleveland, O.

REFRACTORIES (Fire Clay)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Carter County Fire Clay Corp., 212-214 Kitchen Bldg., Ashland, Ky.
Eureka Fire Brick Co., 1100 B. F. Jones Law Bldg., Pittsburgh, Pa.
Harbison-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.

REFRACTORIES (For High Frequency Furnaces)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

REFRACTORIES (Silicon Carbide)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

REFRACTORY CONCRETE
Atlas Lumnite Cement Co., Dept. S-18, Chrysler Bldg., New York City.
Johns-Manville Corp., 22 E. 40th St., New York City.

REGULATORS (Pressure)
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.

REGULATORS (Temperature)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

REINFORCEMENT FABRIC (Electric Welded)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

RESISTORS (Edgewound)
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.

RESISTORS (Graphite Disc)
Allen-Bradley Co., 1320 So. 2nd St., Milwaukee, Wis.

RHEOSTATS (Plating)
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

RINGS (Steel)
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

RINGS (Weldless) (*Also Stainless)
*Midvale Co., The, Nicetown, Philadelphia, Pa.

RIVET SETS
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.

RIVETERS (Hydraulic—Portable and Stationary)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETERS (Pneumatic)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETING MACHINERY
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Shuster, F. B., Co., The, New Haven, Conn.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Jackson, Mich.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

RIVETS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
*Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

RIVETS (Non-Ferrous and Stainless)
Harper, H. M., Co., The 2646 Fletcher St., Chicago, Ill.

RODS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Roebling's, John A., Sons Co., Trenton, N. J.
Seymour Manufacturing Co., 51 Franklin St., Seymour, Conn.

RODS (Drill)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.

RODS (Phosphor Bronze)
Seymour Manufacturing Co., 51 Franklin St., Seymour, Conn.

RODS (Rounds, Flats and Shapes) (*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*Copperweld Steel Co., Warren, O.
*Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.
Youngstown Sheet & Tube Co., The, Youngstown, O.

RODS (Steel and Iron)
Firth-Sterling Steel Co., McKeesport, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

RODS (Welding)—See WELDING RODS

RODS (Wire)—See WIRE PRODUCTS

ROLLER LEVELLERS (Backed-up)
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.

ROLLING DOORS & SHUTTERS—See DOORS AND SHUTTERS

ROLLING MILL BEARINGS—See BEARINGS (Rolling Mill)

ROLLING MILL EQUIPMENT
Alliance Machine Co., The Alliance, Ohio
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Cold Metal Process Co., The, 2131 Wilson Ave., Youngstown, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., The, Alliance, O.
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

ROLLING MILLS (Consulting, Contracting Engineers)
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

ROLLING MILL TABLES
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

ROLLS (Bending and Straightening)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

ROLLS (Sand and Chilled)
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O. Springfield, O.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Steel and Iron)
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co. Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hyde Park Fdry. and Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.-Springfield, O.
Pittsburgh Steel Foundry Corp., Glassport, Pa.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Tinning Machine)
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

ROOFING AND SIDING
Johns-Manville Corp., 22 E. 40th St., New York City.

ROOFING AND SIDING (Corrugated and Plain)
American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
New Jersey Zinc Co., 160 Front St., New York City.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Sons, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

ROOFING (Plastic and Liquid)
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

RUST PREVENTIVES
Alrose Chemical Co., 80 Clifford St., Providence, R. I.
American Lanolin Corp., Railroad St., Lawrence, Mass.
Dearborn Chemical Co., 310 S. Michigan Ave., Chicago, Ill.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Parker Rust Proof Co., 2158 E. Milwaukee Ave., Detroit, Mich.
Smith Oil & Refining Co., Rockford, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

RUST PROOFING COMPOUNDS
Parker Rust Proof Co., 2158 E. Milwaukee Ave., Detroit, Mich.

RUST PROOFING PROCESS
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Parker Rust Proof Co., 2158 E. Milwaukee Ave., Detroit, Mich.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

SAFE ENDS (Boiler Tube)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

SAFETY DEVICES (Electric)
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.

SALT TABLETS
Fairway Laboratories, Div. The G. S. Suppiger Co., 1530 Hadley St., St. Louis, Mo.
Morton Salt Co., 310 So. Michigan Ave., Chicago, Ill.

SAND-BLASTING NOZZLES (Borium)
Stoody Co., 1134 W. Slauson Ave., Whittier, Calif.

SAND CONDITIONING AND PREPARING MACHINERY
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

SAWING MACHINES (Hot and Cold)
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SAWING MACHINES (Contour)
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.

SAWS (Band—Metal Cutting)
Disston, Henry, & Sons, Inc., Tacony, Philadelphia, Pa.
Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Hack)
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Disston, Henry & Sons, Inc., Tacony, Philadelphia, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Hot and Cold)
Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.

SAWS (Inserted Tooth, Cold)
Disston, Henry, & Sons, Inc., Tacony, Philadelphia, Pa.
Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Metal Cutting)
Brown & Sharpe Mfg. Co., Providence, R. I.
Disston, Henry, & Sons, Inc., Tacony, Philadelphia, Pa.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SAWS (Segmental)
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.

SCAFFOLDING (Tubular)
Dravo Corp. (Machinery Div.) 300 Penn Ave., Pittsburgh, Pa.

SCALES
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Fairbanks, Morse & Co., Dept. J75, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.

SCALES (Dial & Recording)
Fairbanks, Morse & Co., Dept. J75, 600 S. Michigan Ave., Chicago, Ill.

SCALES (Laboratory)
Fairbanks, Morse & Co., Dept. J75, 600 S. Michigan Ave., Chicago, Ill.

SCALES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Fairbanks, Morse & Co., Dept. J75, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

SCHOOLS
International Correspondence Schools, Box 9377-B, Scranton, Pa.

SCRAP BALING PRESSES—See BALING PRESSES

SCREENS AND SIEVES
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.
Chicago Perforating Co., 2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Koppers Co., Engineering & Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City

SCREENS (Vibrating)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

SCREW EXTRACTORS
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW MACHINE PRODUCTS
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Hindley Mfg. Co., Valley Falls, R. I.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

SCREW MACHINES (Automatic, Single and Multiple Spindle)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cone Automatic Machine Co., Inc., Windsor, Vt.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

SCREW PLATES
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW STOCK—See STEEL (Screw Stock)

SCREWS
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O
Continental Screw Corp., New Bedford, Mass.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Cap, Set, Safety-Set)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City

SCREWS (Cold Headed)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

SCREWS (Conveyor)
Lee Spring Co. Inc., 30 Main St., Brooklyn, N. Y.

SCREWS (Drive)
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Hardened Self-Tapping)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Machine)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

SCREWS (Machine, Recessed Head)
American Screw Co., Providence, R. I.
Central Screw Co., Chicago, Ill.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
International Screw Co., Detroit, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
New England Screw Co., Keene, N. H.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pawtucket Screw Co., Pawtucket, R. I.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

SCREWS (Non-Ferrous and Stainless)
Harper, H. M., Co., The 2646 Fletcher St., Chicago, Ill.

SCREWS (Self Locking)
Shakeproof Inc., 2525 N. Keeler Ave., Chicago, Ill.

SCREWS (Sheet Metal, Recessed Head)
American Screw Co., Providence, R. I.
Central Screw Co., Chicago, Ill.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Shakeproof Lock Washer Co., Chicago, Ill.

SCREWS (Socket, Cold Forged)
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Thread-Cutting)
Parker-Kalon Corp., 194-200 Varick St., New York City
Shakeproof Inc., 2525 N. Keeler Ave., Chicago, Ill.

SCREWS (Thumb)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Wood, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker, Charles, Co., The, Meriden, Conn.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Southington Hdwe. Mfg. Co., Pawtucket, R. I.
Whitney Screw Co., Nashua, N. H.

SEAMLESS STEEL TUBING—See TUBES

SEPARATORS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 523 E. Smith St., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

SHAFT HANGERS—See HANGERS (Shaft)

SHAFTING
Bliss & Laughlin, Inc., Harvey, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Keystone Drawn Steel Co., Spring City, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
Edgar T. Ward's Sons Co., Carnegie, Pa.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHAKERS
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

SHAPERS
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.

SHAPES (Steel)—See STEEL (Structural)

SHAPES, SPECIAL (Steel)
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laciede Steel Co., Arcade Bldg., St. Louis, Mo.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHEAR BLADES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.
Wapakoneta Machine Co., The, Wapakoneta, O.

SHEARS
Beatty Machine & Mfg. Co., Hammond, Ind.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Haliden Machine Co., The, Thomaston, Conn.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SHEARS, ROTARY (Slitting, Beveling, Circling, Flanging)
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

SHEET BARS
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEET LIFTERS AND CARRIERS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

SHEET METAL PRODUCTS—See STAMPINGS

SHEET METAL WORKERS MACHINES
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Excelsior Tool & Machine Co., Ridge & Jefferson Aves., E. St. Louis, Ill.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

SHEET STEEL PILING (New and Used)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.

SHEETS (Acid Resisting)
International Nickel Co., Inc., The, 67 Wall St., New York City.

SHEETS (Black)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SHEETS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-1013, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

SHEETS (Corrugated)
American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Deep Drawing and Stamping)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Electrical)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc. Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Galvanized)
American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.

WHERE-TO-BUY

SHEETS (Galvanized)—Con.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Hot Rolled and Hot Rolled Annealed)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Lead Coated)
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.

SHEETS (Long Terne)
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Steel Corp., Kokomo, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Nickel Silver)
Seymour Manufacturing Co., 51 Franklin St., Seymour, Conn.

SHEETS (Perforated)
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

SHEETS (Phosphor Bronze)
Seymour Manufacturing Co., 51 Franklin St., Seymour, Conn.

SHEETS (Reinforced)
Erdle Perforating Co., 171 York St., Rochester, N. Y.

SHEETS (Roofing)—See ROOFING AND SIDING

SHEETS (Stainless)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 2351 Curtis St., Middletown, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Massillon, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

SHEETS (Stainless Clad)
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.

SHEETS (Steel)
Mahoning Valley Steel Co., The, Niles, O.

SHEETS (Tin)—See TIN PLATE

SHEETS (Tin Mill Black)
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

SHEETS—HIGH FINISH (Automobile, Metal Furniture, Enameling)
American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHELLS (Seamless Drawn)
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.

SHOVELS (Power)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

SIEVES—See SCREENS AND SIEVES

SILICO-MANGANESE
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

SILICON METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

SKELP (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SLAG GRANULATING MACHINES (Blast Furnace and Open Hearth)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

SLITTERS
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

SMALL TOOLS
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.

SOAKING PITS
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

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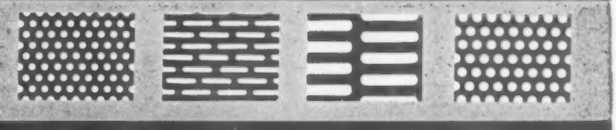
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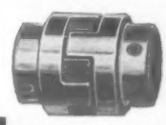
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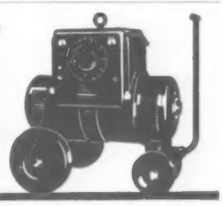
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SOLDER
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

SOLENOIDS (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

SOLVENT (Degreasing)
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

SPACING TABLES
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.

SPECIAL MACHINERY—See MACHINERY (Special)

SPEED REDUCERS
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Grant Gear Works, 2nd & B. Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
New Departure Div., General Motors Corp., Bristol, Conn.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.

SPIEGELEISEN
Electro Metallurgical Co., 30 E. 42nd St., New York City.
New Jersey Zinc Co., 160 Front St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

SPIKES (Screw)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SPINDLES (Grinding)
Bryant Chucking Grinder Co., Springfield, Vt.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.

SPINDLES (Lathe)
American Hollow Boring Co., 1054 W. 20th St., Erie, Pa.

SPLICE BARS (Rail)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SPRINGS (*Also Stainless)
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
*Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Hubbard, M. D., Spring Co., 438 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
*Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SPRINGS (Alloy)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Coil & Elliptic)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Compression)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Oil Tempered—Flat)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Torsion)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Valve)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINKLERS (Automatic)
Grinnell Co., Inc., Providence, R. I.

SPRUE CUTTERS
Shuster, F. B., Co., The, New Haven, Conn.

STACKS (Steel)—See BRIDGES, ETC.

STAINLESS STEEL—See BARS, SHEETS, STRIP, PLATES, ETC.

STAMPINGS
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Crosby Co., The, 183 Pratt .St, Buffalo, N. Y.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Dayton Rogers Co., Dept. "C," 2830-13th Ave., So., Minneapolis, Minn.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.
Hubbard, M. D., Spring Co., 438 Central Ave., Pontiac, Mich.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Shakeproof Inc., 2525 N. Keeler Ave., Chicago, Ill.
Stanley Works, The, Bridgeport, Conn. New Britain, Conn.
Toledo Stamping & Mfg. Co., 90 Fearing Blvd., Toledo, O.
Transue & Williams Steel Forging Co., Alliance, O.
Whitehead Stamping Co., 1667 W. Lafayette Blvd., Detroit, Mich.

STAMPS (Steel)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

STAPLES (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STARTERS (Electric Motor)
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.

STEEL (Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Crucible Steel Co. of America, Room 117, 405 Lexington Ave., New York City.
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Simonds Saw & Steel Co., Fitchburg, Mass.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Edgar T. Ward's Sons Co., Carnegie, Pa.
Washburn Wire Co., Phillipsdale, R. I.

STEEL (Alloy, Cold Finished)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Edgar T. Ward's Sons Co., Carnegie, Pa.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Clad—Corrosion Resisting) (*Also Stainless)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
*Copperweld Steel Co., Warren, O.
*Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Superior Steel Corp., Carnegie, Pa.

STEEL (Cold Drawn)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Roebling's, John A., Sons Co., Trenton, N. J.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Edgar T. Ward's Sons Co., Carnegie, Pa.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Cold Finished)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Keystone Drawn Steel Co., Spring City, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Roebling's, John A., Sons Co., Trenton, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Corrosion Resisting)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Crucible Steel Co. of America, Room 117, 405 Lexington Ave., New York City.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Rustless Iron & Steel Corp., 3400 E. Chase St., Baltimore, Md
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (Die)
Crucible Steel Co. of America, Room 117, 405 Lexington Ave., New York City.
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (Drill)
Crucible Steel Co. of America, Room 117, 405 Lexington Ave., New York City.

STEEL (Electric)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Copperweld Steel Co., Warren, O.
Crucible Steel Co. of America, Room 117, 405 Lexington Ave., New York City.
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.

WHERE-TO-BUY

STEEL (Electric)—Con.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (High Speed)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Crucible Steel Co. of America, Room 117, 405 Lexington Ave., New York City.
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (High Tensile, Low Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cold Metal Process Co., The, 2131 Wilson Ave., Youngstown, O.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Nitriding)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL (Rustless)—See STEEL (Corrosion Resisting)

STEEL (Screw Stock)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Spring)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Cold Metal Process Co., The, 2131 Wilson Ave., Youngstown, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.

STEEL (Stainless)—See STEEL (Corrosion Resisting)

STEEL (Strip, Copper Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Thomas Steel Co., The, Warren, O. Rockefeller Bldg., Cleveland, O. 2351 Curtis St., Middletown, O.

STEEL (Strip, Hot and Cold Rolled) (*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cold Metal Process Co., The, 2131 Wilson Ave., Youngstown, O.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
*Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
*Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
*Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.
Weirton Steel Co., Weirton, W. Va.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

STEEL (Strip, Tin Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Thomas Steel Co., The, Warren, O.
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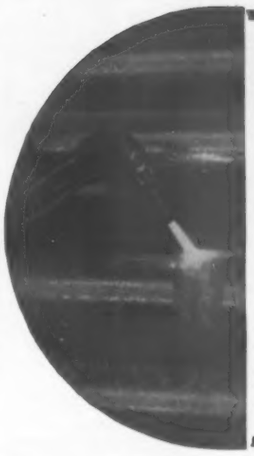

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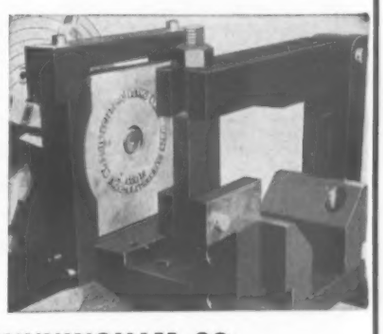

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Statement of the ownership, management, circulation, etc., required by the act of congress of Aug. 24, 1912, and March 3, 1933, of STEEL, published weekly at Cleveland, Ohio, for Oct. 1, 1941. State of Ohio, County of Cuyahoga, ss. Before me, a notary public in and for the state and county aforesaid, personally appeared Geo. O. Hays, who having been duly sworn according to law, deposes and says that he is the Business Manager of STEEL, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of Aug. 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit: 1.—That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, The Penton Publishing Co., Cleveland, O.; Editor, E. C. Kreutzberg, Cleveland, O.; Managing Editor, A. J. Hain, Cleveland, O.; Business Manager, Geo. O. Hays, Cleveland, O. 2.—That the owners are: Names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock: Agly Co., Pittsburgh, Pa.; Edwin C. Barringer, Washington, D. C.; Sam'l E. Bool, Cleveland, Ohio; Richard M. Bourne, Cleveland, Ohio; Dorothy L. Cole, Long Island, N. Y.; County National Bank & Trust Co. of Santa Barbara, Santa Barbara, Calif.; J. R. Dawley, Cleveland, Ohio; Ernest C. Dempsey, Richard Inglis & Central National Bank of Cleveland as Trustees under agreement with John A. Penton, dated Feb. 16, 1924, Cleveland, Ohio; The Fanner Manufacturing Co., Cleveland, Ohio; George O. Hays, Cleveland, Ohio; Russell C. Jaenke, Cleveland, Ohio; S. H. Jasper, Pittsburgh, Pa.; A. L. Klingeman, Cleveland, Ohio; E. C. Kreutzberg, Cleveland, Ohio; J. D. Pease, Mount Dora, Florida; L. E. Penton, Los Angeles, Calif.; Earl L. Shaner, Cleveland, Ohio; Edward L. Estep, Chesterland, Ohio; Charles J. Stark, Cleveland, Ohio; Penelope M. Stark, Cleveland, Ohio; Edith L. Werner, Cleveland, Ohio; Grace Whelan, Santa Barbara, Calif. 3.—That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: John Hancock Mutual Life Insurance Co., Boston, Mass. 4.—That the two paragraphs next above, giving the names of owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stocks, bonds, or other securities than as so stated by him. Geo. O. Hays. Sworn to and subscribed before me, this 30th day of September, 1941. (Seal) H. L. Richey. (My commission expires May 8, 1942.)

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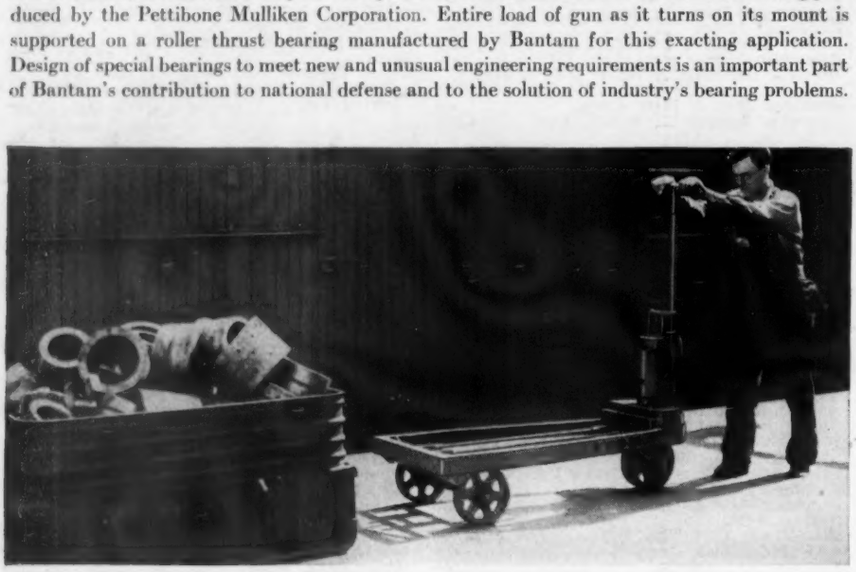
IN THE NEWS

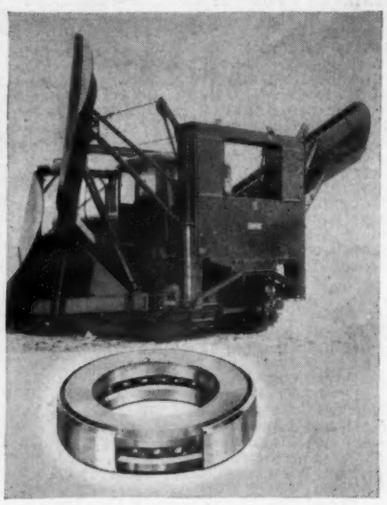
WITH BANTAM BEARINGS

ONE OF THE LARGEST GUNS in use by the Army of the United States is this 155-mm. now being produced by the Pettibone Mulliken Corporation. Entire load of gun as it turns on its mount is supported on a roller thrust bearing manufactured by Bantam for this exacting application. Design of special bearings to meet new and unusual engineering requirements is an important part of Bantam's contribution to national defense and to the solution of industry's bearing problems.

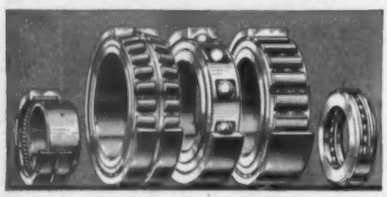
SIMPLICITY AND STURDINESS of construction characterize the oil well pumping units built by The Bridgeport Machine Company. Bridgeport selects Bantam Quill Bearings for use on the equalizers of many of its heavier-duty units, because the Quill Bearing combines the advantages of simple construction, high capacity, small size and long life. For further information on this unusual anti-friction bearing write for Bulletin H-104.



EASY OPERATION is essential in all types of materials handling equipment. This modern hydraulic Lift Truck manufactured by LYON-Raymond Corporation uses Bantam Ball Thrust Bearings in the head assembly to insure easy response to the steering lever.



WHEN SNOW PLOWS START TO WORK, every part is subjected to heavy loads and severe strains —yet must function with the highest efficiency, without risk of failure. Carl H. Frink, maker of Frink Sno-Plows, uses Bantam Ball Thrust Bearings at several points to assure reliable bearing performance.



FOR OUTSTANDING DEFENSE PRODUCTION, Bantam has received the Navy "E" Award, one of twenty-five presented to U. S. industrial concerns engaged in the manufacture of defense equipment. Backed by long experience in designing and making anti-friction bearings of all major types, Bantam is in an unusual position to help you in selecting the right bearing for *your* requirements. TURN TO BANTAM with your bearing problem.

BANTAM BEARINGS

STRAIGHT ROLLER · TAPERED ROLLER · NEEDLE · BALL

BANTAM BEARINGS CORPORATION • SOUTH BEND • INDIANA

ANNOUNCING—

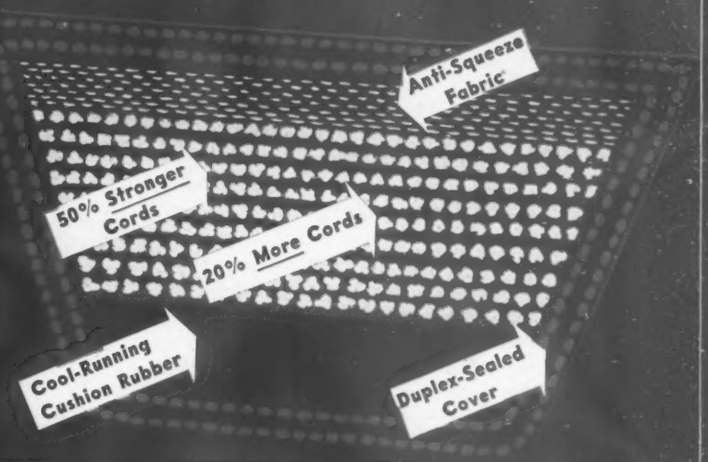
50% MORE CORD STRENGTH IN NEW TEXROPE SUPER-7!

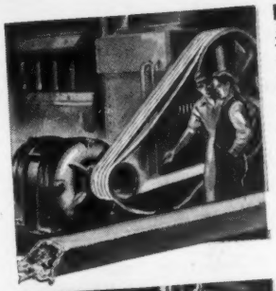
1 50% STRONGER CORDS! Sensational new Flexon process makes cords 50% stronger than even those in former great Texrope belts.

2 20% MORE CORDS! Count them! You get 20% more of these tough, extra pulling power cords in every Texrope Super-7.

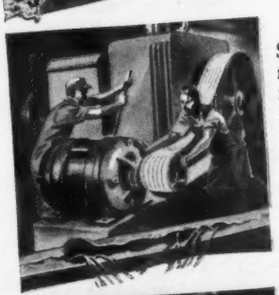
3 INCREASED LIFE! Cords float on amazing cool-running cushion rubber that absorbs shock . . . actually increases belt life phenomenally.

4 EXTRA PROTECTION! Exclusive duplex-sealed cover protects pulling cords against dirt, grit, moisture, and other adverse elements.





LOOK OUT FOR DANGER in belts with stiff, unpliable cords! Such belts *look* strong . . . but actually they buckle over sheaves, build up excessive heat that attacks pulling cords. Result: Belt failure far sooner than you expect it.



WARNING SIGN! Sagging, slipping belts mean too much stretch not backed up by balanced cord strength. Motor must be pulled back often to take up slack. Result: When stretch limit is reached belt breaks under tension.

SUPER-7 TEXROPE BELTS are made by amazing Flexon process that *combines* flexibility with low stretch . . . great strength. Cords float on cool-running, shock absorbing cushion rubber. Result: *true* strength . . . *true* pulling power . . . *true* endurance.

A1435

DISCOVERED! A new way to make load-carrying V-belt cords — the Flexon process!

In this amazing new method, the cords are made smaller . . . and 50% stronger. And because they are smaller, 20% more of them are used in each belt.

That's the big news behind the new Texrope Super-7 V-belt. But that's not all the news —

For in this new belt we use a new special heat-resisting rubber compound that acts as a cushion to absorb operating shocks and dissipate internal heat. And we wrap the belt in a new "duplex-sealed" two-ply cover for extra protection against dirt, moisture, and other destructive elements.

Added up, these four-fold advantages mean you get *more pulling power . . . greater resistance to excess stretch . . . and much longer life in Super-7 than in any belt you ever heard of.*

We want you to know all about Super-7 V-belts. We want you to try them. For here are belts *that are better* . . . and *they cost no more!*

For the complete story about Super-7, call the Texrope dealer near you . . . or the Allis-Chalmers district office in your neighborhood.

Available in All Sizes —
½ hp to 2000 hp.

*Trade mark registered U. S. Patent Office. Texrope Super-7 Belts are the result of the cooperative research and design genius of *two* great companies —Allis-Chalmers and B. F. Goodrich—and are sold exclusively by Allis-Chalmers.

ALLIS-CHALMERS
MILWAUKEE · WISCONSIN

Behind the Scenes with STEEL

Editorial Worries

■ The editors of STEEL think they have worries from time to time, and they do, but compared to Mr. Crum, who edits *The Greenbrier Gazette,* they don't know what trouble really is. At least that's what we would gather from Mr. Crum's recent editorial blast:

"We can please not more than two people in twenty. Mr. A begs for less twaddle and gossip. Reverend X resents the girdle ads. Miss B wants better advice to lovers; her father demands we hate certain political celebrities more; her mother asks why we don't clean out the saloons. Mrs. C says the recipes we print won't cook. And why did we give the Daughters of Delphi twenty lines for their bingo, asks Mrs. D, when her Tennyson Tea for the Sisters of Psyche received but fifteen lines.

"One likes the wings, one likes the neck, one the leg. The day we boiled the egg we should have poached it, and the day we shirr it, it should have been fried. Our heart is full. We have had enough.

"Anyone who will pay us fifteen dollars a week for setting type and feeding press can have *The Gazette* and all that pertains thereto, free and without incumbrance—lock, stock and barrel, hook, line and sinker, hell-box and devil!"

Mountain Railroading

■ Following a recent visit to an industrial center in southern Pennsylvania, Guy Hubbard, STEEL's machine tool editor, whose article this week you won't want to miss, had an unusual experience in mountain railroading which he tells with his own particular brand of dry humor.

With a friend bidding him an ominously solemn farewell at a little rundown station on the crest of one of the Blue Ridge mountains, he climbed aboard a two-car train whose ancient locomotive had a whistle which sounded exactly like the minor-chord voice of Ned Sparks. Almost immediately a battered candy butcher came through crying, "Chocolate bars, chewing tobacco and aspirin tablets!"

No one had any stomach for chocolate bars, but there was lively consumption of aspirin tablets during some of the more terrifying downward plunges. As for the chewing tobacco, Guy insists that he saw sales being made from the rear platform to the engineer and fireman as the locomotive missed the rear of the train by inches on some of the sharper curves.

There's much more to it, but Guy always ends it up in the firm belief that he owes his continuing life to the little invention by George Westinghouse back in 1869.

Need Any Customers?

■ If you're interested in a very readable little discussion on advertising in these times drop a note to Doremus & Co., 120 Broadway, New York, and ask them for a copy of "No, thank you . . . we don't need any customers."

London Carries On

■ This week, be sure to read Vincent Delport's quarterly review of the European situation. STEEL's London office has continued to function right through the blitz and Mr. Delport wrote not long ago that although "we have had some hellish nights I am glad to say that all the London staff is safe and sound." J. C. Crump of the London staff is a Post Warden in his residential district, and Mr. Delport, who has been with STEEL abroad for the past twenty years, is also an A. R. P. Warden in his home town.

Old Friend

■ Incidentally, Lucien W. Moore, new general purchasing agent for the Crane Co., Chicago, was STEEL's European correspondent reporting news on France and Belgium from Paris during the middle twenties and a close friend of Mr. Delport, with whom he worked in those days. Mr. Moore now reads STEEL regularly and says it brings back a lot of old and fond memories.

Air Raid Protection

■ We see where the Office of Civilian Defense has issued a planning guide entitled "Protection of Industrial Plants and Public Buildings" dealing with protection against air raids—just in case. If you haven't seen a copy, write OCD at Washington.

Still In Demand

■ We have mentioned here before that STEEL's two reprint handbooks on "Modern Shell Production" have been going like hot cakes and are both now in their second printing with a combined total of over 3000 copies in use throughout the country. That, we feel, is something of a record, and the bulging file of letters in our desk is full of comments like this one from Walter Siegerist, President, The Medart Company, St. Louis:

> *I took this book with me on a trip to Oklahoma and Texas and read it while on the train. I find it to be an excellent treatise on the subject. The articles are excellent reading and I am keeping this book as a ready reference to settle arguments that sometimes come up with reference to procedures in the various operations concerning shell production.*

But H. D. Thompson of the Chattanooga Stamping & Enameling Co., Chattanooga, Tenn., caused the biggest stir. One morning last week he telephoned from Chattanooga and wanted a copy of each handbook sent airmail immediately, with a further request that we wire back collect what plane they would arrive on so that he could meet it. Everything worked out swell and Mr. Thompson had his Shell Books at 5:20 that same day.

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